

Micro PAVER Version 5.3

User Manual

Micro
PAVER

5.3



US Army Corps
of Engineers®

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Micro PAVER 5.3

User Manual

US Army Corps of Engineers
Construction Engineering Research Laboratory

Dr. M.Y. Shahin, PAVER Principal Investigator

Dr. Simon Kim, Research Associate

Jeffrey A. Burkhalter, Research Associate

Kurt A. Keifer, Research Associate

Gregory A. Wilken, Research Assistant

Shauna K. Shepston, Research Assistant

Kevin A. Hoene, Research Assistant

Amir M. Moid, Research Assistant

Scott J. McDonald, Technical Specialist

Christina Eng, Research Assistant

Craig A. Loudon, Research Assistant

Stephanie E. Carey, Research Assistant

William H. Welborn, Research Assistant

Robert Wofford, Research Assistant

Lindsey N. Canney, Research Assistant

US Army Corps of Engineers CERL

<http://www.cecer.army.mil>

<http://www.cecer.army.mil/paver>

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M. Y. Shahin
Micro PAVER Principal Investigator
U. S. Army Corps of Engineers
ERDC-CERL

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System Requirements

Recommended Hardware

Processor Speed: 2GHz or faster

Memory: 512MB RAM (1GB preferred)

Updating to Micro PAVER 5.3/6.0

Note

When converting from an earlier version of Micro PAVER, the recommended procedure is to:
1) backup the database being imported and 2) run the verification tools on the imported database in version 5.3/6.0.

For Micro PAVER 4.x/5.x users, the conversion to Micro PAVER 5.3/6.0 is an easy procedure that can be split into a few simple tasks. These tasks include: importing e40 or e50 files into PAVER, exporting e60 files, updating GIS coverages created in PAVER 4.x/5.x, and updating some of the system tables in PAVER 5.3.

Updating the Database

The first step is to import the databases created in PAVER 4.x/5.x into PAVER 5.3. This update is done using the same Import/Export tool that was featured in previous versions of PAVER. For information on how to import the e40 and e50 files, see [5.3 Import Procedure](#) on page 39.

Micro PAVER 5.3 Improvements

Micro PAVER 5.3 is not simply an updated version of Micro PAVER 5.x. The main purpose of PAVER 5.3 is to serve as a migration tool between PAVER 5.0-5.2 versions and Micro PAVER 6.0. While serving in this capacity, version 5.3 offers a number of additional improvements as well. The following list highlights PAVER 5.3's purpose as well as its improvements.

Compatibility with PAVER 6.0 Database

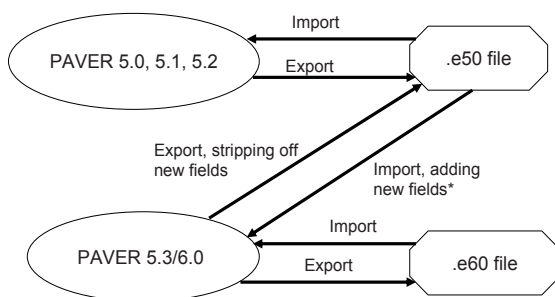
PAVER 5.3 Revised Structure

In PAVER 5.2, for a given inspection date, an extrapolated distress value was stored for the *last calculated* condition index value. In PAVER 5.3, an extrapolated distress value is stored for *each* condition index for a given inspection date.

Import/Export

Micro PAVER 5.3 supports the import/export of .e50 files from PAVER 5.0-5.2 as well as .e60 files from PAVER 6.0.

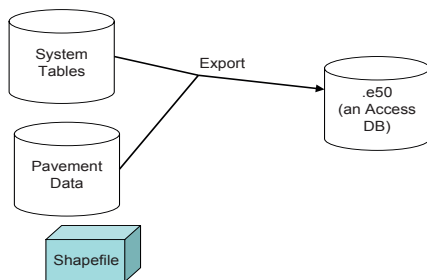
PAVER 5.3/6.0 Import/Export



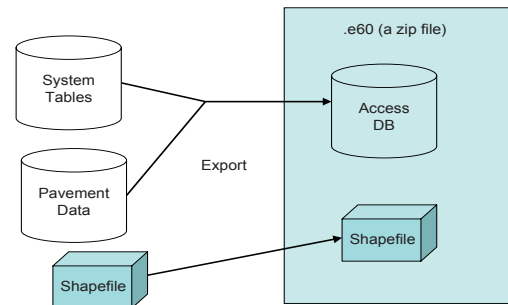
* All new fields are automatically calculated on import

The .e60 files exported from PAVER 5.3 and 6.0 are zip files that include an Access database file and related shapefiles. The .e50 files of earlier PAVER versions consisted solely of Access database files.

Import/Export in PAVER 5.0-5.2



Import/Export in PAVER 5.3/6.0

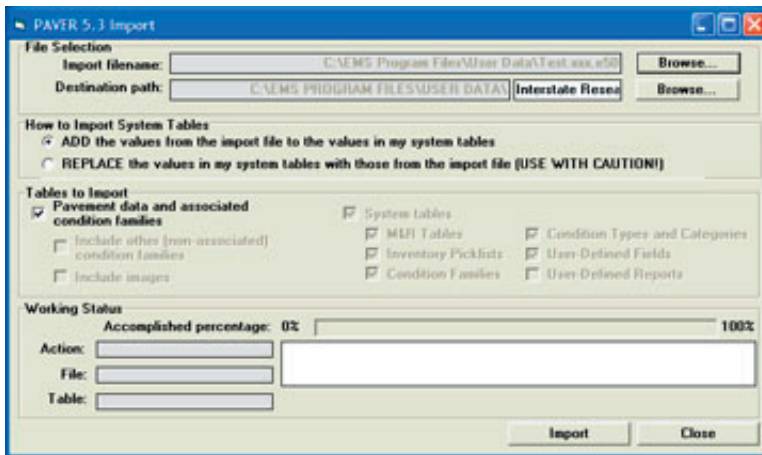


The new PAVER 5.3 Import/Export

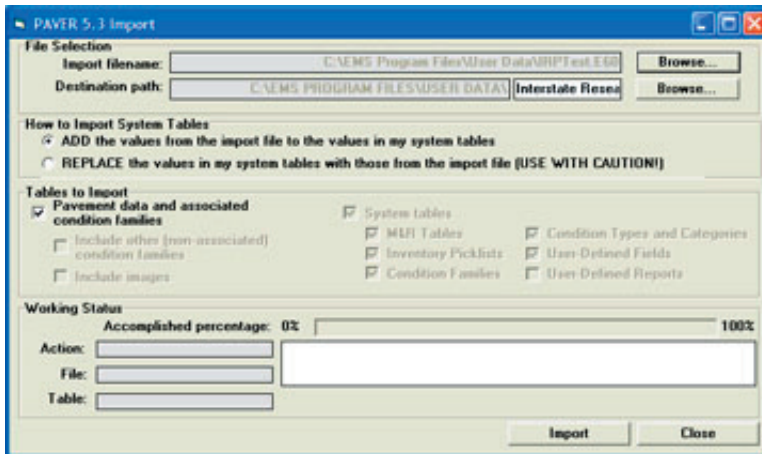
PAVER 5.3 export in .e50 mode.

PAVER 5.3 export in .e60 mode.

PAVER 5.3 import in .e50 mode for a file with pavement data.



PAVER 5.3 import in .e60 mode showing new system table import options.



In addition the 5.3/6.0 data structure includes a distress unique identifier. The identifier is used to prevent the duplication of distress values when a database is split and recombined.

New Features

• New Airfield Distress Manual

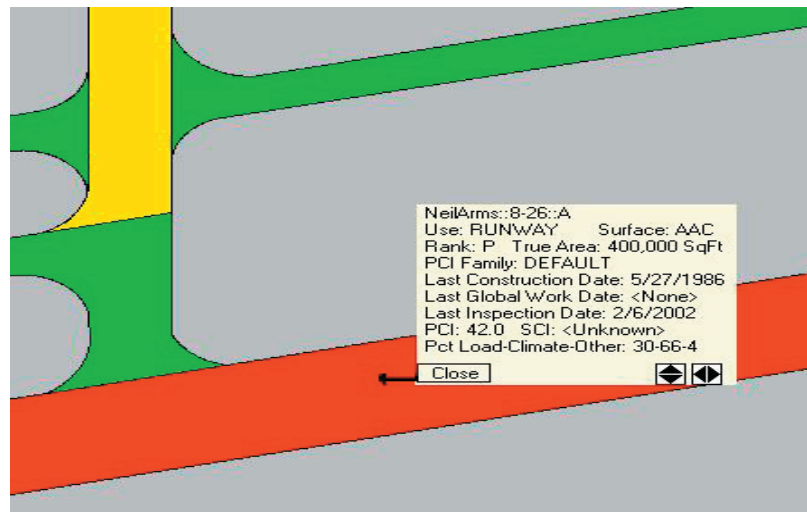
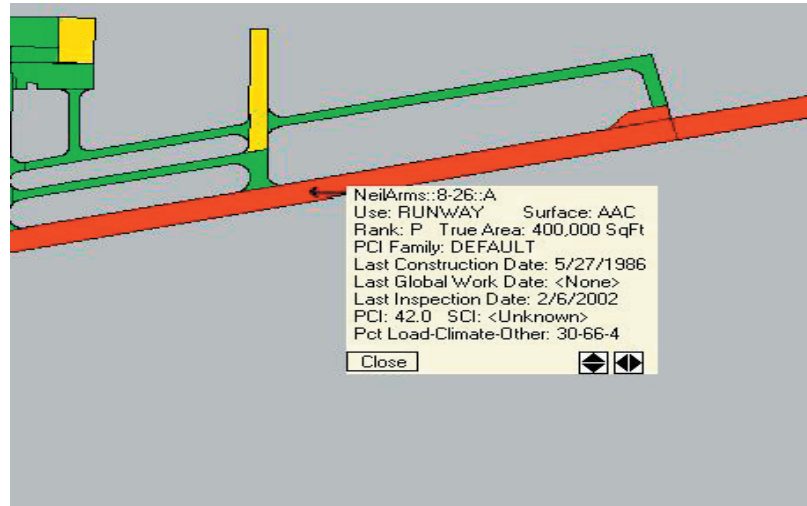
• All distress manual images now in HTML format

• “True Area” Input Option

Many new implementations utilize GIS, which provides the actual area of a given section. Rather than inputting the section dimensions and manually calculating the area adjustment, PAVER 5.3 allows for the input of the true area of a section as well as the length and width. PAVER will then calculate the area adjustment for each section based on the information provided.

- **PAVER 5.3 and 6.0 GIS Identifying Tool:**

Another new feature is the GIS Identification Tool. When the user right-clicks on any defined section in a GIS view, a pop-up window opens to display important information about that section. This includes pavement ID, rank, true area, assigned PCI family, last construction date, last inspection date, PCI, SCI, ACN/PCN and percent deduct due to load/climate/other. This feature gives users an effective way to quickly answer questions about a section and provides useful information for project development. The image below shows how the new feature appears on the map.



- **Bug Fixes For 5.2.6**

- Dust distress size
- More accurate English/metric conversion of linear distresses
- PCI Video import

Overview

Introduction to Micro PAVER

Micro PAVER 5.3 for Windows (herein referred to as PAVER) is an automated pavement management system (PMS). It is a decision making *tool* for the development of cost effective maintenance and repair alternatives for roads and streets, parking lots, and airfields. PAVER provides you with many important capabilities, including:

- Pavement network inventory
- Pavement condition rating
- Development of pavement condition deterioration models (Family Curves)
- Determination of present and future pavement condition (Condition Analysis)
- Determination of maintenance and repair (M&R) needs and analyzing the consequence of different budget scenarios (Work Planning)

PAVER Organization

Note

The ten buttons on the **PAVER Button Bar** are arranged to reflect the logical sequence of pavement management.

The main features of PAVER are accessible from ten buttons arrayed across the top of the PAVER Desktop. The buttons have been arranged to reflect the logical sequence of pavement management. They initiate the most frequently used features in PAVER. Additional features are accessed through the Visual Menu.

This button array is referred to as the PAVER Button Bar. By clicking one of the buttons, you launch one of ten principal PAVER components. These components are:

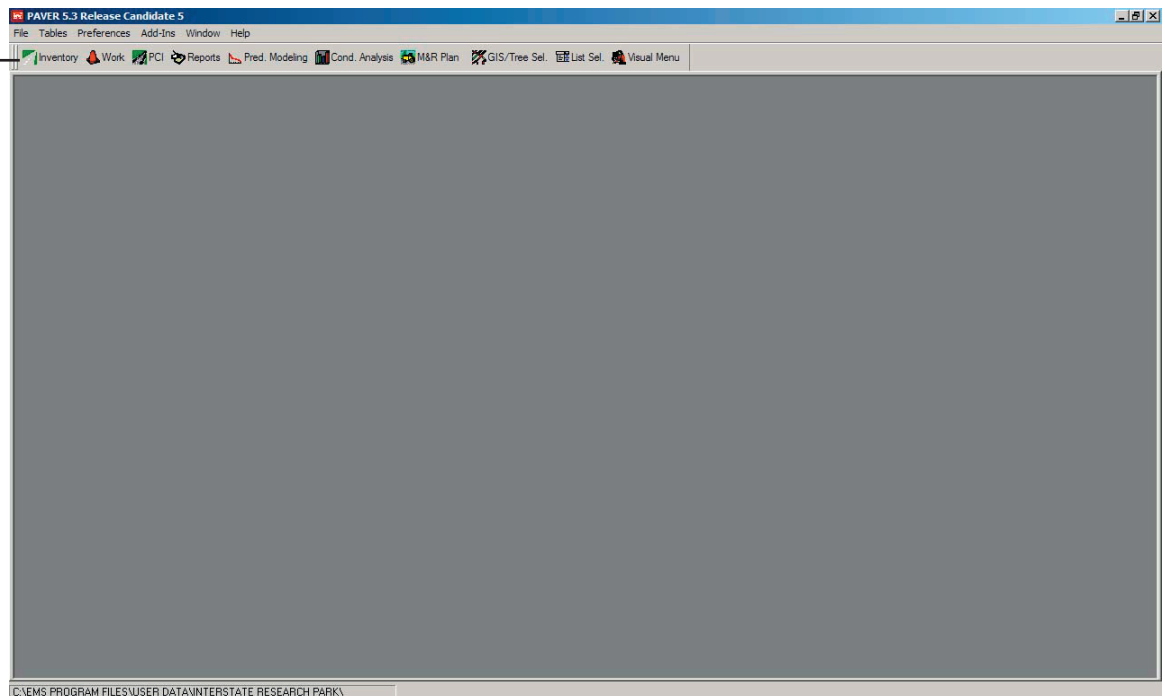
Inventory Data (Inventory)	Inventory data entry and summary charts
Work Information (Work)	Work required and work history
PCI Inspections (PCI)	Field inspection data entry
Reports	PAVER reports and summary charts

Prediction Models (Pred. Modeling)	Build and assign condition prediction models
Condition Analysis (Cond. Analysis)	Condition analysis report
M&R Plan	Maintenance and repair planning report
GIS/Tree Selection	Pavement selector using GIS
List Selection	Pavement selector using pull-down lists
Visual Menu	A detailed menu with all PAVER options

Like other Windows programs, additional program features are accessed from the drop down menus located above the PAVER Button Bar. The PAVER Menu provides standard Windows features such as file and print services (File New, File Open, File Combine/Split, Print, Printer Setup and Exit), editing (Cut, Copy and Paste), and Windows management and help.

The PAVER Menu also provides specialized PAVER options for accessing and editing system tables (Tables) as well as changing the units of measure from English to Metric (Preferences).

**PAVER
Button
Bar**



Operating Features

Basic PAVER Features

PAVER introduces several new Engineered Management System (EMS) tools: EMS Query, Report Viewer, Right Button Click on Tables, and Right Button Click on Graphs. The PAVER program is designed using commercial Windows components and the user interface follows standard Windows protocols. Familiarity with basic Windows user skills is assumed in the design of the program, the preparation of program documentation, and the design of the help system.

Several specialized custom tools are featured in PAVER. These tools are Windows consistent and after a brief introduction, will enhance your use of PAVER. These tools are also being made available to developers of other EMSs. Consequently, the features you learn to use in PAVER will be of use in other EMS systems.

Spreadsheet Forms

The basic form for editing and viewing data in PAVER is a table that operates like a spreadsheet. In some instances, these forms are used only to present data and the values displayed cannot be edited. On other occasions, you are able to edit the data or add new lines to the table.

As with other tools, highlighting the spreadsheet and right clicking invokes a menu of spreadsheet tools. Depending on the context, some of the right button click features may not be available. Inactive features are listed in the menu as light gray, while active features have a darker color. The basic right button click spreadsheet features allow table zoom, table layout customizing, add/edit/delete record, search, import/export, print table, and graph options.

Spreadsheet
form

Tab Name	File Name	User Name	Tab Value
Branch	BSGNT1	Branch User Set	0
Branch	BSGNT2	Branch User Set 2	0
Branch	BSGNT3	Branch User Set 3	0
NETWORK	NSGHT1	Network User Set 1	10
NETWORK	NSGHT2	Network User Set 2	10
NETWORK	NSGHT3	Network User Set 3	10
SECTION	SSGNT1	Section User Set	30
SECTION	SSGNT2	Section User Set 2	30
SECTION	SSGNT3	Section User Set 3	30

Index Cards

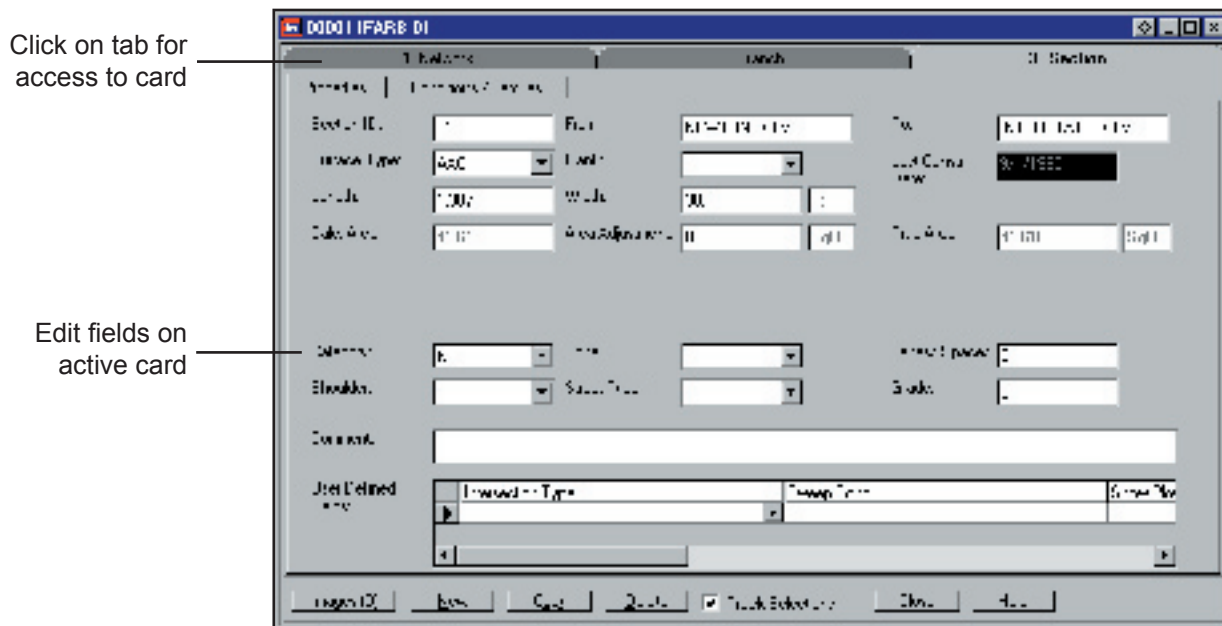
Index-style data entry windows are used in several forms by PAVER: Inventory, Prediction Modeling, Condition Analysis, M&R Planning, and EMS Query. The index-style windows place data entry fields on multiple forms that look and operate like paper index cards. Therefore, if the PAVER form you are using has an index card style interface, you may switch between multiple cards without opening or closing additional windows.

When a window containing index-style data cards first opens, one of the form's index cards is the initial active card. Each index card form includes a tab with a descriptive title. When the index card is active, the contents of the card are visible and can be edited. Only the tab portion of non-selected index cards is visible. Typically, the selected index card and its table is highlighted with a brighter background color. The non-selected index card tabs are darker. Colors vary depending on the Windows color scheme you have selected.

Note

Changes made on the index data cards are made real-time. PAVER automatically saves any changes the user makes.

To change the active index card, use the mouse to point to an inactive index card title and left click. The selected card becomes the active card and the previously active card becomes inactive. You can now edit or add entries to the fields on the active index card. After editing is complete, click the close button on the form or use the Windows close form menu. Your data is saved to the database in real time as you make your edits. This means there is no action required to save your changes.



Tab Tables

PAVER Tab (tabular) Tables are spreadsheet-like tables used in PAVER to display and edit system configuration information. The Tab Tables are accessed from the Tables menu option. Tab Tables look and operate like spreadsheets. Right button click features are used to print, zoom and configure the tables. Buttons on the bottom of the tab form are used to add and delete records.

There are two types of Tab Tables, basic (Independent) and linked (Dependent). The basic table operates like a standard spreadsheet except that data input into the table is controlled by the series of buttons (Close, Add and Delete) that are arrayed along the bottom of the Tab Table forms. Clicking the Add button inserts a new record into the table, which can then be edited. The Delete button is used to remove the highlighted record in the table. The mouse or arrow keys are used to move up and down the rows and across columns in the active Tab Table. The active record in the table can be edited. The Close button is used to close the Tab Table.

The second type of Tab Table is a linked table. The linked table uses the records of a basic table or tables as the basis for its data entry. The linked table is referred to as the child, or dependent table, and the basic table is the parent (Independent) table. For example, the work type cost table uses three work type tables: localized, global and major as the basis for its entries. Therefore, when you add a record to the work type cost table (a linked table), you click the Add button and get a pick list of possible values to add. The table is formed from the entries in the linked table's parent table(s) (localized, global, and major M&R tables in this case).

Linked tables help PAVER enforce consistency in its data tables. For example, if the work type cost table was not linked to the M&R tables it, would be possible to develop costs for M&R procedures that were not even defined. This type of inconsistency, if it occurred, can damage the accuracy of analysis routines like the Work Plan.

Printing Screen Images

Printing in PAVER is accomplished in one of three ways. First, the standard PAVER reports include specialized forms for printing reports (see the Standard Reports section). The PAVER right button click on tables or graphs tool provides a method of printing tables or graphs. In certain situations, you may wish to print the contents of a screen as it appears, which can include multiple tables, graphs or other data entry forms. To print the image on your screen, select File from the PAVER Menu and then Print from the File sub-menu. In some instances you will note that the Print option is not available to select from the File sub-menu. This means that there is currently no printable object on the PAVER Desktop.

After selecting Print, the print dialog box appears on your screen. The form contains a drop list labeled Print What. Open the drop list and select Form Image. Click the OK button to send a print of the active PAVER window to the printer. You may use the Printer Setup dialog window to select an alternate printer if you have access to multiple printers. After you have printed the form image, the print dialog window closes and you return to the PAVER window that was active when you selected the Print option.

Note

Each time that you wish to print a graph in color, you must select color using the **System** button on the graph Toolbar.

Graphs in PAVER can be printed in either black and white or color. The default setting in PAVER is black and white printing for graphs. To choose color printing, right button click on the graph and select Toolbar. On the toolbar click the System button. Under Printing, change the selection from Mono to Color and click OK.

Units of Measurement

To change units from English to metric, go to the Preferences selection on the PAVER Menu located above the PAVER Button Bar. Click once on Preferences and then select Metric Units from the Preferences sub-menu. Rounding error is not introduced into stored data values if repeated changes between English and metric units occur, because all measurement values in PAVER are stored as metric values. Changing the setting in Preferences changes the filters that are used for presenting data on PAVER screens and reports. To ensure that the display properly reflects the unit change, it is best to close all data entry and report screens before switching preferences.

Adjusting Table and Graph Sizes

Tables and graphs automatically re-size to the available space on your computer display. As the number of active tables increases, the number of lines allocated to each table reduces. If a table is associated with a graph, the table and the graph share the horizontal space that is allocated to the table. You can adjust the space allocated between a table and its associated graph by pointing to the vertical bar that separates a table from its graph and then, while pressing the left mouse button, drag the separator bar to the right or left. You cannot manually increase or reduce the vertical space allocated to a table in the Report Viewer. If you want to increase the vertical space available for a table you must close one of the other Report Viewer tables. You may use the zoom function on active tables with the right button click tool for a temporary larger presentation of a table or a graph.

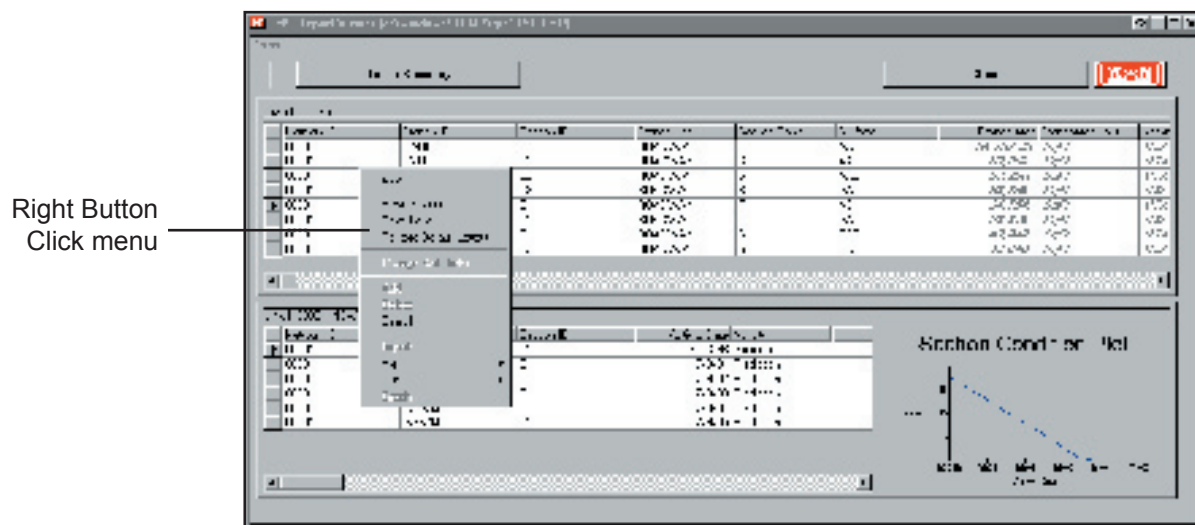
Right Button Click on Tables

Whenever possible, information in PAVER is presented in tables. These tables are used to input, edit, and review reports (EMS Report Viewer and Reports). The tables in PAVER are equipped with several features that enhance the capabilities of the PAVER system. These features include:

- Table printing
- Exporting the table to Excel
- Changing the formatting of the table
- Zooming on the table
- Adding or removing fields
- Sorting the table

To access the extended table features you must first make the spreadsheet table active, by clicking on the table. Once the table is active and the mouse pointer is over any portion of the table, right click to invoke the menu of extended table features. Select items from the right button click menu by pointing to the menu item and left clicking.

In addition to the right button click table features, column widths can be reduced or enlarged when a table is active. To change column width, point to the vertical line positioned between the columns. When the mouse pointing indicator changes from the large arrow to the small double arrow icon, click and drag the column border to the desired size.

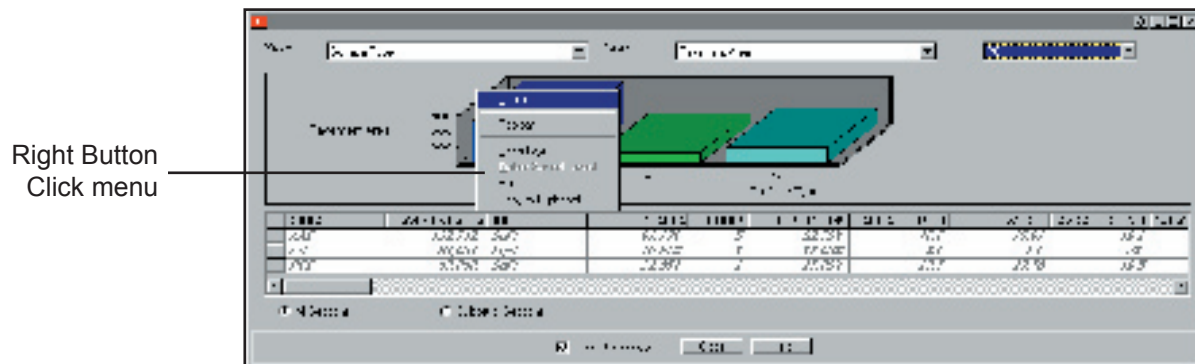


Right Button Click on Graphs

PAVER graphs can be printed, customized and zoomed in the same manner as PAVER tables. To view a PAVER graph, make the graph active by clicking on the graph. While the graph is active and the mouse pointer is anywhere on the graph right click to invoke the graph menu. Select items from the graph feature menu which is accessible with a right button click.

You can customize the look of PAVER graphs on the fly by using the EMS right button click tools. The graph Zoom feature enlarges the graph to the full extent of the window in which the graph is located. From the zoomed graph window, you can copy the graph to the clipboard to later paste into spreadsheets, presentation programs or other Windows applications. To return to the original window, right click on the zoomed graph and select Unzoom.

Toolbar invokes a graph editor (Graph Control) that allows you to customize graph type and presentation. For example, you may change the graph type from a two dimensional bar graph to a three-dimensional pie chart. The Save Layout feature saves the current graph configuration so that on subsequent visits to the current graph it will retain the graph properties you specify using the Toolbar. The final graph feature, Print, allows you to print your graph to a Windows printer.



EMS Query Tool

The EMS Query Tool is used in several places in PAVER to select a subset of pavement sections to use in reports and data modeling. The query tool can also be used to specify the sorting order of data. Selection and sorting criteria specifications can be stored and retrieved by name in the Stored Criteria box. The query tool also reports the record count (number of sections selected), as filtering queries are built.

Using the EMS Query Tool

Filter criteria are entered using the drop boxes arrayed across the query form. Fields are entered from left to right and top to bottom. As you enter query information, only the next field will be highlighted for user selection. For example, use the first entry in the Field column to select Surface. Once you have selected Surface, the Comparison field is highlighted. After selecting a query field and the comparison evaluator ($=$, $>$, $<$, $>=$, $<=$, $<>$), the Compare To field becomes active. The drop list on the Compare To field lists the available choices in the database for the

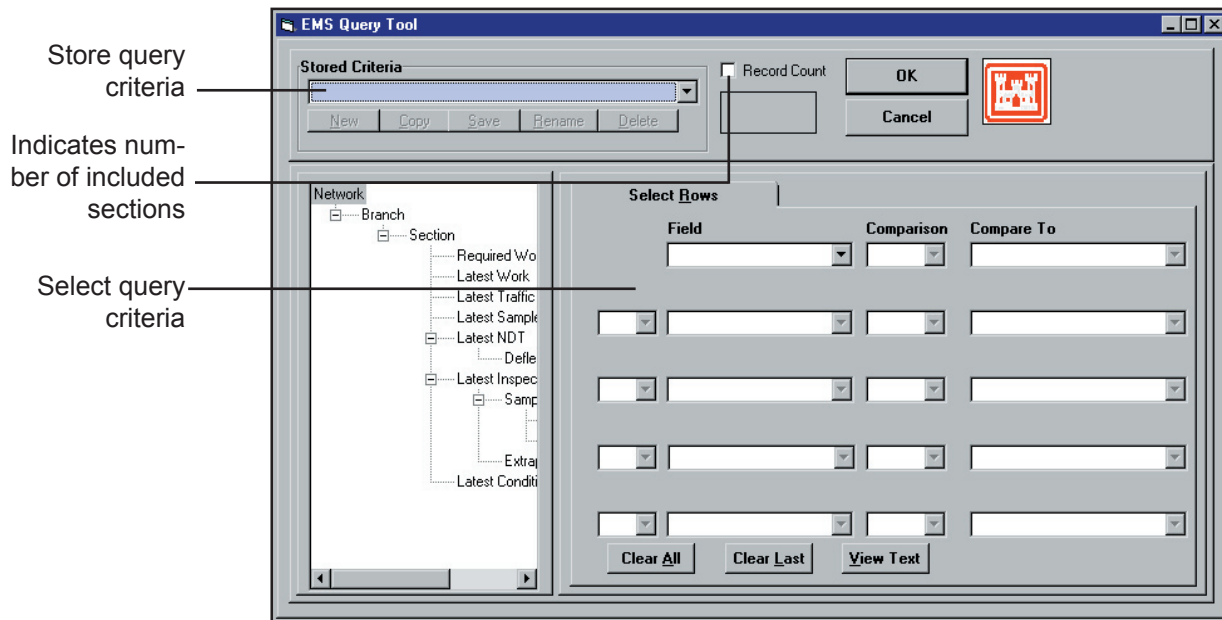
Note

Clicking the **Record Count** checkbox shows real time updates of how many pavement sections are currently selected by the query tool.

selection you made in the Field column. After you make a selection in the Compare To field, the record count indicator will change as the query you are building is applied to the database in real time.

The first column on the query form contains the query statement operators (And, Or). These operators are used to join the individual query statements. To see the Structured Query Language (SQL) query that you have built with the query tool, click the View Text button at the bottom of the screen. The Clear All button removes all selection criteria on the screen. Click the Save button on the EMS Query Tool to save a set of report criteria.

The AND/OR operators require some additional clarification. For example, if the user wants to include pavement sections constructed with asphalt and concrete then the correct operator is OR. The query will return any sections that fit either of the conditions. However, the AND operator only returns sections that fit all of the listed conditions. For example, selecting asphalt surfaces and branch use equal to parking lots with the AND operator returns only asphalt parking lots. Using AND with



the first example will return nothing, since it is impossible for a section to be both asphalt and concrete surfaced.

Report Viewer - Summary and Detail Options

The PAVER analysis reports: Condition Analysis Report, and the M&R Report are presented in the EMS Report Viewer. The EMS Report Viewer is a tool that provides a framework for displaying multiple spreadsheet-like tables that contain report information. The spreadsheets in the Report Viewer can be associated with graphs that operate in conjunction with the spreadsheet tables. The Report Viewer organizes the presentation of report results in two basic views, the summary view and the detail view. The summary view includes high level views of summarized report data. The detail version of the report includes section by section details that are covered in the summary version of the reports. To switch from between the Summary and Detail views, click on the Go to Detail/Summary button.

Note

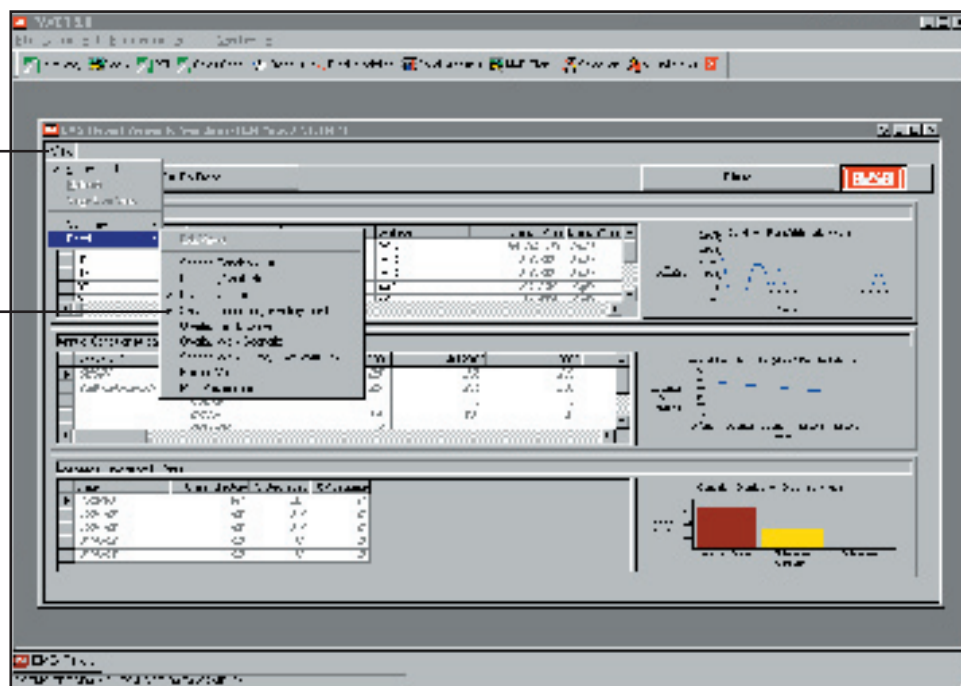
When selecting and deselecting several different report views, **AutoRefresh** can be deselected so that PAVER won't redraw the graphs until the user re-selects the option.

View Menu - Display Specific Report Information

The Report Viewer includes a View option that is used to open and close the various spreadsheet views of the report data. You may use the View in the Report Viewer window to configure the report viewer so that it presents only the information you wish to view. The default presentation of the Report Viewer is the summary version. To turn off one of the summary tables (and its associated graph), select View from the Report Viewer window, Summary from the View sub-menu and then select the table which you want to turn off. Tables or graphs which are active in the current report view have a check mark to the left of the table or graph name.

Under the Detail sub-menu, Plan Parameters opens a table displaying the parameters that were used to configure the current report. This is convenient for checking the settings you requested when you ran the report without having to leave and rerun the report.

View Menu
Select tables and graphs to display



Note

Although the **View** button appears grey, it is always active.

Report Viewer Tables

The spreadsheet tables in the report viewer are standard PAVER tables and support the right button click on tables features. When an EMS Report Viewer report (I.E. Condition Analysis or M&R Work Plan) is displayed the tables are made active with a left click.

Spreadsheets in the Report Viewer can be associated with graphs. These graphs are implemented in two different ways. The first type associates a graph directly with a single row, the active or highlighted row, of the table. In this case, as the user changes the active row in the spreadsheet, the graph dynamically adjusts so that the graph reflects the active row in the spreadsheet.

The second type of graph association is as an overlay on an existing graph. For example, in the Condition Analysis Report, a table showing combined section condition history and projections is linked to a graph that plots the condition over time. This graph can further be overlaid with a plot of the family curve assigned to the section. As elsewhere in the program, graphs in the Report Viewer can be zoomed, printed or configured with the right button click on graphs feature.

Exiting the Report Viewer

When you have completed reviewing a Report Viewer report, close the report by closing the Report Viewer window. Click on the Close button in the top right corner of the Report Viewer window. Windows users may also use the mouse to select the close Window symbol (X) located in the upper right corner of the window.

After you close a report, you are prompted to save the report. If you choose to save the report, a file dialog box window is presented so that you can name the report to be saved.

Note: Each report type has its own unique file extension: Condition analysis reports are .rpc files and M&R Work Planning reports have .rpw extensions. These extensions should be maintained when you name a report file.

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System Tables

Define User Fields

The PAVER system is designed so that you may assign user defined fields to each level of the inventory (network, branch, and section.) The advantage of this capability is that PAVER allows you to sort the database at any level according to criteria that you have defined. This is helpful if you want to select certain networks, branches, or sections for reports or work plans. There are two types of user defined fields. SORT fields are designed to be pick list fields, requiring you to select among a predefined set of choices. Additional User Fields require the user to enter data.

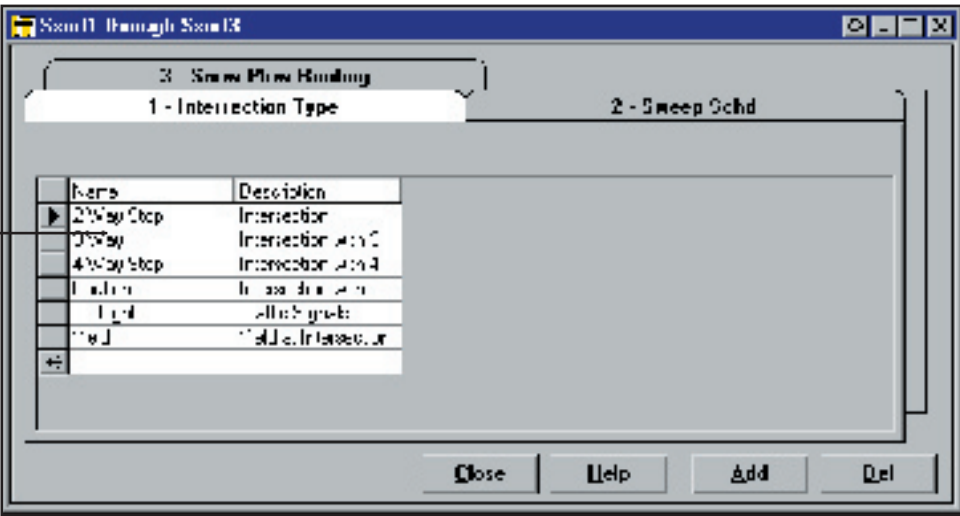
NSORT - BSORT - SSORT

Note

To change the default name given on a **SORT** tab, see **Customize NSort, BSort, SSort Headings**.

At each level of the Inventory hierarchy (network, branch, and section), PAVER allows you to create three SORTs. Under the main menu, select Tables... Define User Fields...SORT for the desired level of inventory. Enter data by clicking on the field you wish to edit. The entries for Name should be short and easily recognizable since these will be displayed in PAVER as the options presented in the picklist for the SORT field. The Description entry should indicate the complete name. Click Add to add more entries for the sort, and click Delete to delete the selected entry. The selected entry is indicated by an arrow in the left margin. To assign criteria for the other two SORTs, click on their corresponding tabs.

Sample entries for SSORT by intersection type _____



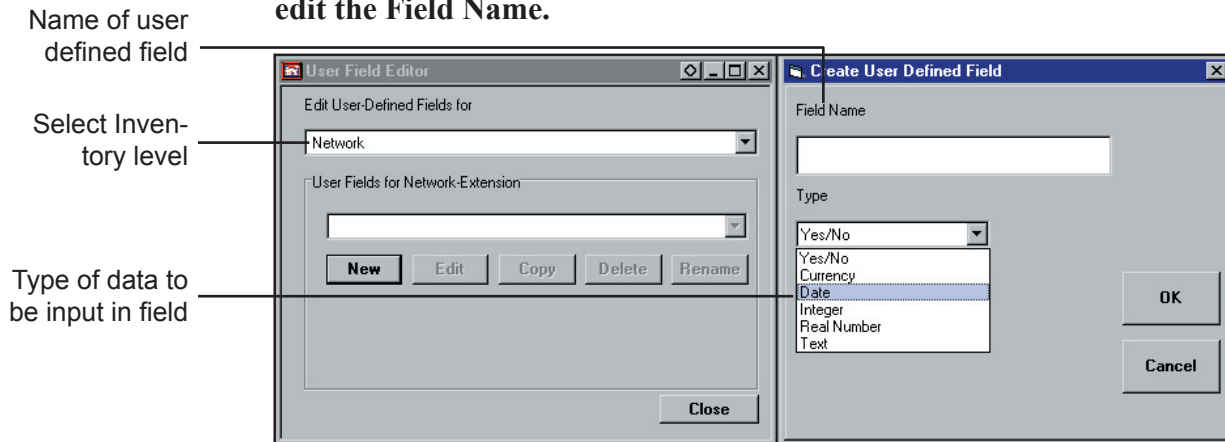
Additional User Fields

This section allows you to create user-defined fields in which you may enter data. From the PAVER main menu, select Tables...Define User Fields...Additional User Fields. To create a new field, first select the desired inventory level and click on New. A second window appears. You need to supply the following information:

- Field Name - The entry for this is displayed as the Additional User Field name when using this capability in PAVER.

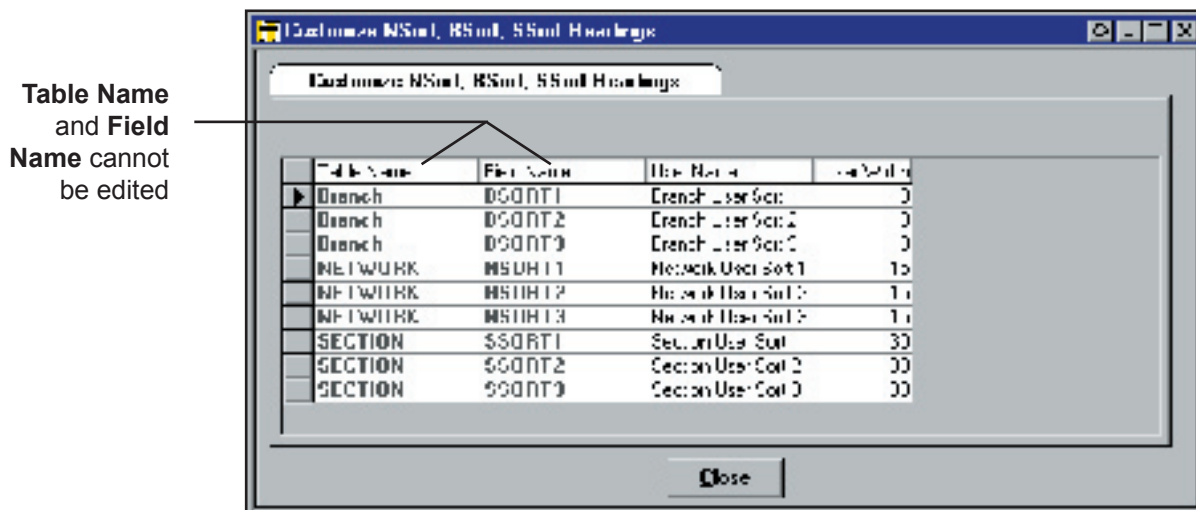
- Type - Designate what kind of data is to be put into the field: Yes/No, Currency, Date, Integer, Text, etc. When you use the Additional User Field in PAVER, you are only able to enter data of the Type you specify.

To edit the Type of an already existing entry, select it from the list of User Fields and click on Edit. To copy the field, click on Copy and assign a new name for the field. Delete deletes the selected field, and Rename allows you to edit the Field Name.



Customize NSort, BSort, SSort Headings

This window allows you to set the values for the User Name (the name displayed in PAVER) and the User Width (the size of the field) for selected preset fields in PAVER. The first two fields, Table Name and Field Name, are displayed in italics and cannot be edited.



Inventory Pick Lists

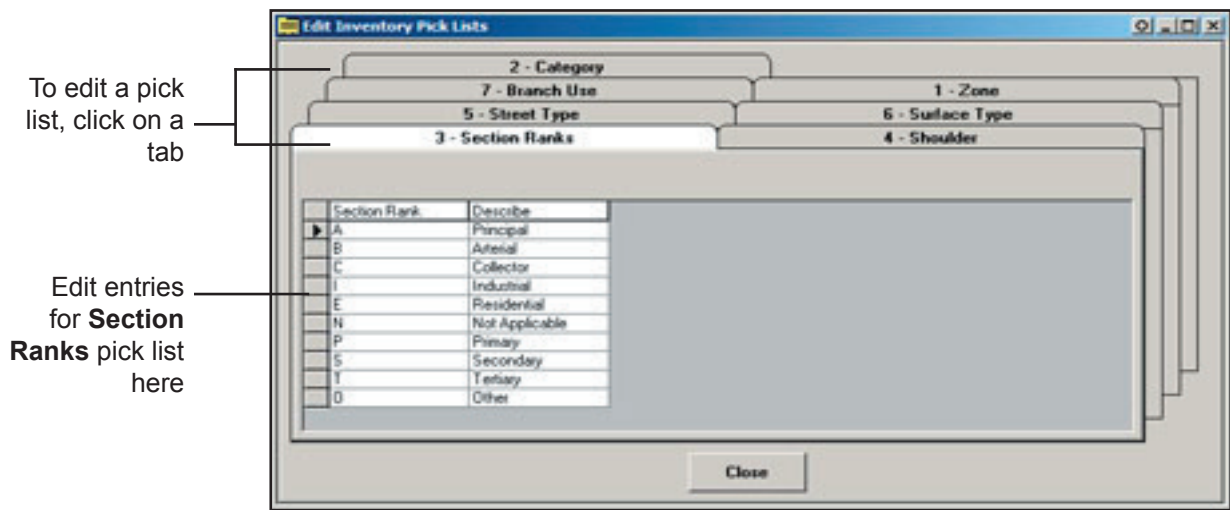
Note

On the **Section Ranks** tab, you are not able to add entries or edit the already existing section rank names.

This window displays seven tabs that provide editing access to a group of “pick lists” within PAVER. All of these tabs allow you to add items to the current list. In some cases, existing table data is considered to be default and cannot be deleted. In most areas, PAVER will direct the process of data input to conform to the necessary PAVER database formatting. Some fields allow you to enter any text value, while other fields produce a prompt to the user to select an option from a list that is displayed. Examples of using this window are:

- Customizing Zone names
- Naming a new Surface Type
- Adjusting M&R Priorities for different Rankings.

Clicking Add adds a new record to the table. Before clicking Delete, first highlight the desired record by clicking on the box at the left of the record. PAVER asks you to confirm every Delete action.



M&R Plan Tables

All tables found under this category are tables that PAVER uses when executing the M&R plan. Like previous tables, most of these tables allow you to add items and delete non-default items. To edit a cell in the table, click on the cell you wish to edit and enter the new value. Once changes are made, they are automatically saved to the system. A brief description of each table follows.

Note

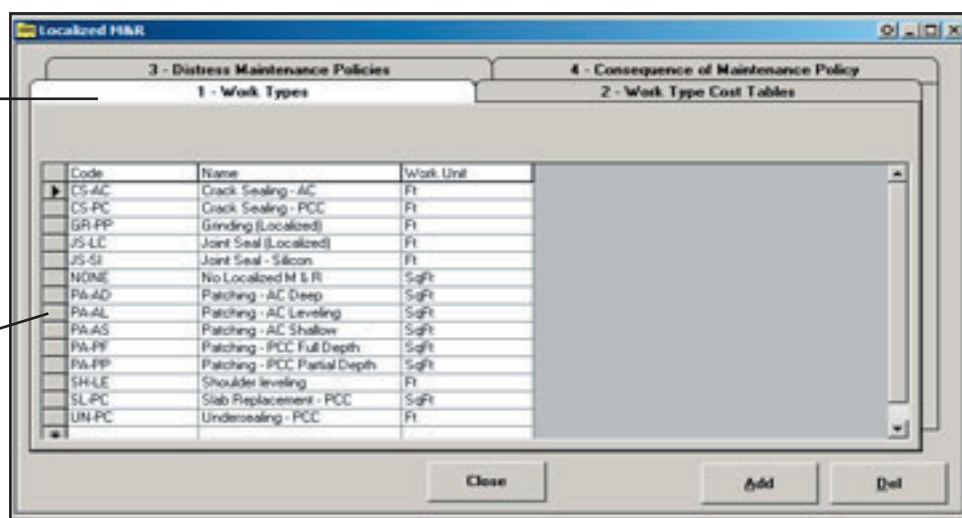
For more information on **M&R Work Plan** execution, see page 95.

Localized M&R

- **Work Types:** A listing of all work types classified as localized repairs.
- **Distress Maintenance Policies:** You can define separate tables and group different localized work types for different maintenance scenarios.
- **Work Type Cost Tables:** You can create different cost tables to correspond with different jobs or regions. There must be a cost entered for all work types listed.
- **Consequence of Maintenance Policy:** For every work type listed in the localized category, there is an associated table here. Each table consists of a list of all distresses related to this work type and the resulting distress produced as a result of performing this type of work. This assists the Work Plan in predicting future PCI's.

Cost scenarios for **Localized** work

All **Localized Work Types** are listed here



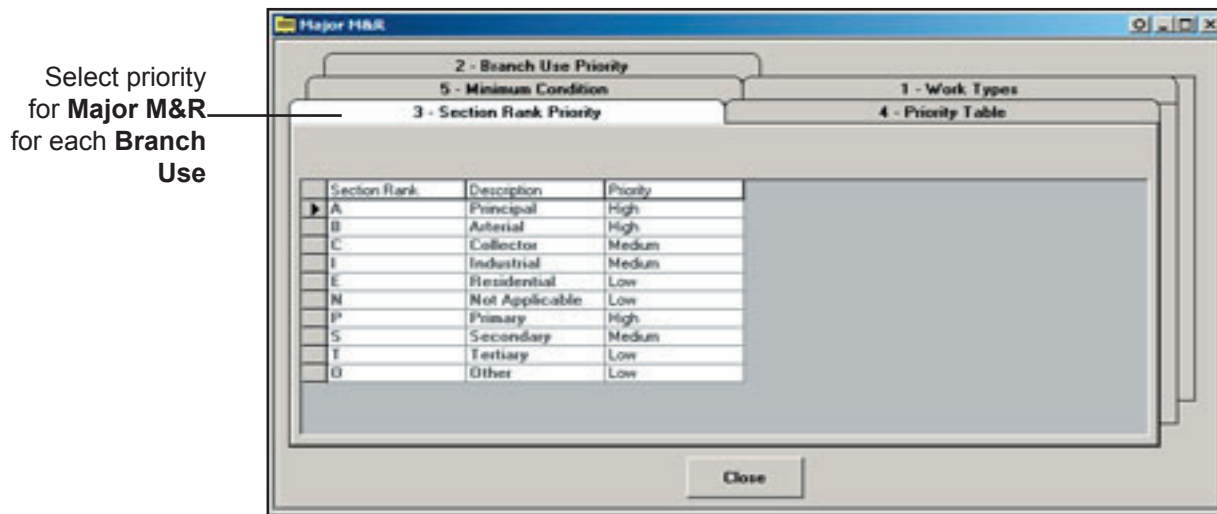
Global M&R

- **Work Types:** This is a listing of all work types considered Global. This includes M&R work applied over a larger area of pavement. Other data included in this table is the Application Interval that work would be reapplied and the Delta Age, or change in age, of the pavement. This "Delta" is defined as the time (in years) it would take for the condition of the pavement to return to where it was prior to application of the global treatment. Again, the M&R Plan uses these numbers when predicting condition.
- **Cost:** This is similar to Localized. The user can create different cost tables depending on the scenario.

Major M&R

- **Work Types:** All work types considered to be major are listed here.
- **Branch Use Priority:** The user has the ability to assign a priority to pavements based on their declared usage. This priority is considered during M&R Plan execution and determines how limited funds are spent.

- **Section Rank Priority:** The user may assign a priority to pavements based on section rank.
- **Priority Table:** This is a priority matrix based on Branch Use Priority and Section Ranking. The lower the number, the higher the priority.
- **Minimum Condition:** This table allows the user to set the Minimum Condition or critical PCI. A critical PCI (or Minimum Condition) is set for the combination of each Branch Use, Section Rank, and Year combination.



M&R Cost by Condition

This window allows the user to create cost tables for different scenarios. Costs are grouped into four categories:

- **Local:** These costs refer to localized repair work triggered in the M&R Plan in the “Policy > Critical” section.
- **Stop Gap M&R:** These are localized repair costs triggered in the “Policy < Critical”
- **M&R Airfields:** This is a cost list of major M&R work done on all pavements that fall into the “Airfields” category.
- **M&R Roadways:** These are costs associated with major work done on all pavements classified as “non-airfield”, such as roads, parking lots, etc.

For the above cost tables, the costs are for doing work “by condition”. Enter an estimate on the pavements based on a range of conditions from 0 to 100 by increments of 10. The unit cost to perform work are generally less for a pavement with a better condition. However, you can create tables and customize them in a way that reflects the actual cost of doing work. The M&R Plan uses these figures to calculate budgets for all years beyond the first. Click on New Table and enter a name for your cost by condition scenario. Click on any cell you wish to edit and type in the new value.

M&R Cost By Condition

Name: Default Cost by PCI Range

Cost Category	Units	0	10	20	30
Localized > Critical	SqFt	\$0.75	\$0.56	\$0.39	\$0.22
Major M&R Airfields	SqFt	\$3.33	\$3.33	\$3.33	\$3.33
Major M&R Roadways	SqFt	\$2.50	\$2.50	\$2.50	\$2.50
Localized < Critical	SqFt	\$0.15	\$0.10	\$0.07	\$0.04

New Table Rename Del Table Close

Cost per square foot for major M&R done on roadways with PCI of 0 to 9

Hint

You can create a budget of \$10,000/Year and use the Budget multiplier feature in the M&R Work Plan.

Budgets

Here, you can create tables to specify a budget for each year. When running the Work Plan, you can select from a list of budgets. To create your own budget, click on New Table. You are given the option of copying the budget that is displayed. When creating a new table, select the copy option to save time entering data if most values are the same. Enter Year and budget Amount information. By placing actual budget numbers in a budget table, you can restrict the spending of the work plan to a specific budget. Creating different budget tables also allows you to compare the results of different Work Plan scenarios.

Budgets

Funds By Year

Name: 100K per Year

Year	Amount
1/1/2000	\$100,000.00
1/1/2001	\$100,000.00
1/1/2002	\$100,000.00
1/1/2003	\$100,000.00
1/1/2004	\$100,000.00
1/1/2005	\$100,000.00
1/1/2006	\$100,000.00
1/1/2007	\$100,000.00
1/1/2008	\$100,000.00
1/1/2009	\$100,000.00
1/1/2010	\$100,000.00
1/1/2011	\$100,000.00
1/1/2012	\$100,000.00
1/1/2013	\$100,000.00
1/1/2014	\$100,000.00

New Table Rename Del Table Close Add Del

All budgets in your system are listed here

Enter a budget amount for each year

Select Condition Types

To make condition types available for use in PAVER, they must be declared in this window. Condition types will be classified as Numeric or Textual. You may declare Minimum and Maximum Values for Numeric Condition Types. To make a condition available for use in PAVER choose “yes” in the Selected column. If you would like to keep the condition data in the table for future use but do not wish to make it accessible, a “no” in the Selected field hides the condition from the program.

Define Condition and Age Categories

The user may establish a set of categories for each condition available in PAVER. The table for each set of condition categories consists of a name for the category (i.e. “Good”, “Poor”, etc), a high and low value to establish the range for the category, and associated colors for each category to be used in the graph and GIS text. The Age Categories tab is simply a table of age brackets by which you can group pavements. These tables are used in the graphical display of condition information throughout PAVER.

New

You may now create your own condition index based on your selection of distresses.

Define User Distress Indices

You have the option to create a user defined index. These indices are computed with the same engine that PAVER uses to calculate the PCI, so the index is a customized PCI. After naming the index, select every distress and severity level that is to be included in the computation. At this point, PAVER then uses deduct values from only the specific distresses indicated. Other distresses are ignored for this index. After naming the index and selecting the applicable distresses, this distress appears on the Numeric Condition Types tab of the Condition Type Selection table. The only way to delete the newly created index is to return to the User Defined Distress Indices table.

Misc. Other Tables

There are four tables here that allow you to enter specific information into PAVER:

Aircraft Type

This table holds information on a variety of aircraft and will be used in later versions of PAVER to catalog airfield traffic and its effect on pavement condition.

Materials

This table is a list of all material types, with Item number and Description, that are available for selection within PAVER. These are used in the Work section of PAVER, where you can list the specifics of work that has been performed, including the type of material used. You can add any material types to this list by entering an Item and Description.

Layer Construct

This table contains information on different work types associated with base preparation. In order to enter a line item of work specifically for base course, establish the work type in the Layer Construct table. The information on these lists is accessible from Work, under the History tab.

Unit of Measure (Field) Settings

Here, select a particular unit from a pick list to be associated with measurements used within PAVER.

Database Tools

Combine/Subset Database

The Combine/Subset option enables the user to combine multiple databases, or database segments, into a single database or separate databases into multiple segments. This tool is located in the external 5.3 Database Tools, which can only be run when PAVER 5.3 is closed. The Combine option is also useful for making a copy of a database to protect an original.

Note

It is recommended that you utilize a scratch file (a temporary working file) as the destination for all **Combine/Subset** operations.

The Combine/Subset form has four components: source file selection, destination file specification, selection criteria and processing status. Click the Select button associated with the large file selection list window labeled Source to identify the file(s) to be combined, split, or copied. To combine databases you need to select two or more files. Select only one file if you are subsetting or copying a file. Specify the target for the combined or subset database by clicking the Select button associated with the window labeled Destination. Enter a new file name for the database that you are creating.

The Selection Criteria button invokes the EMS Query Tool to filter the source databases. For example, you can combine several databases choosing to select only those sections from the source databases that have surface type equal to AC and rank equal to P (primary). Note that the selection criteria you specify depends on the values in the first source database you select for the combine operation. For example, if the first database you select has no AC pavements, the EMS Query Tool can not be set to select AC as the filter for surface type.

Select source database(s)

Select a file name for the new database

Run **Combine/Subset** procedure

Source

Destination

Selection Criteria

Processing Status

File:

Table:

Status:

Execute

Exit

The Execute button launches the Combine/Subset operation. The processing status area of the screen monitors the progress of your operation and posts the results. Once complete, click Exit to close the Combine/Subset form and return to the PAVER desktop. Use the File/Open option from the PAVER Menu to select the newly combined, subset, or copied database.

Import / Export

Note

It is recommended to always export data as an e60 file, unless the exporting for use in PAVER 5.2 or earlier.

The Import/Export utilities, located in the external 5.3 Database Tools, are used to exchange data between different computers running PAVER. The database sender uses PAVER Export to create a single file. The receiver uses PAVER 5.3 Import to transform a single file (with the extension “e40”, “e50” or “e60”) to a working pavement database in their PAVER system. Once in the system of the receiver, the database can be opened.

5.3 Export Procedure

The 5.3 Export window is divided into four sections: Export Type, Options, File Selection, and Working Status. The contents of the Export file are determined by the selection of one of three options that are located at the top of the Export form. A description of each Export Option follows.

- When exporting to an e60 file:

- The user has the option to include User Defined Reports.
- When exporting System Tables only, the option is available to export specific components of the System Tables.
- GIS Shapefile is automatically included with data.

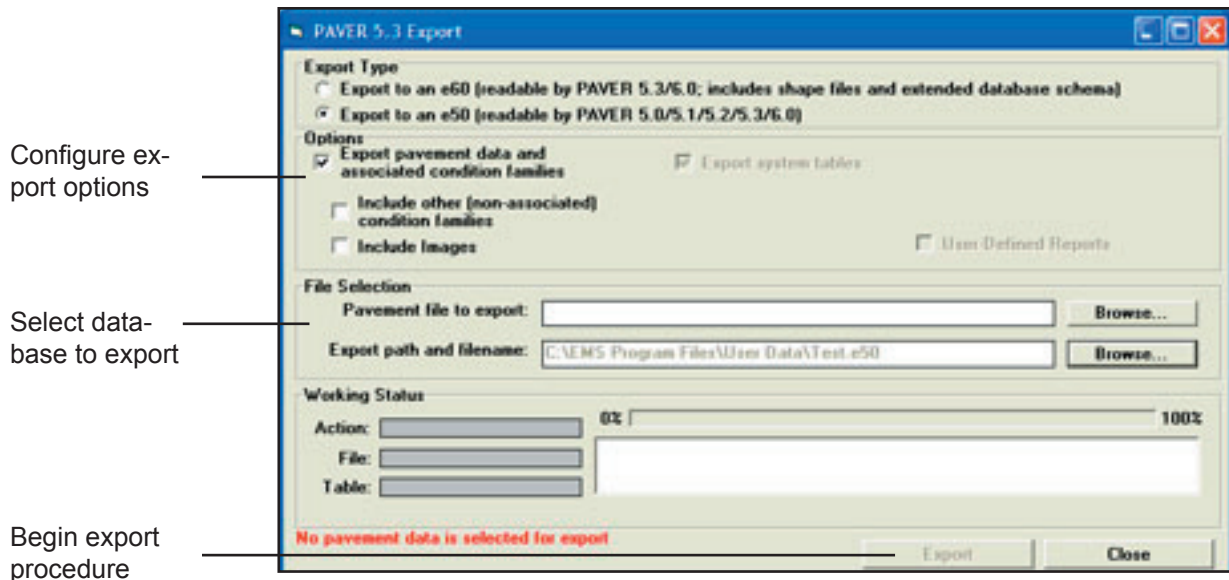
- When exporting to an e50 file:

- There is no option to include User Defined Reports.
- When exporting System Tables only, the entire Systems Table must be exported.
- GIS Shapefiles must be transferred manually.

Configure the 5.3 Export file by selecting the check box next to the appropriate option. As you configure your export file, consider that the system importing the file you are creating imports all the information in the export file unless the importing user takes special steps not to overwrite existing files. If you specify that an export file includes all system files, the person importing your file will replace their system files with the system files that you have exported.

When creating an export file, you must specify the pavement database to export. You may do this by clicking the Browse button in the File Selection area for Pavement file to export. The export file that is created will be located as indicated by the Export path and file name selection.

When these steps are complete, click the Export button located on the lower left portion of the export window. The Working Status portion of the export window displays the progress of the export process and indicates the completion of the export file. You may reconfigure the export options to create another export file or click the Exit button to leave 5.3 Export.



5.3 Import Procedure

Note

When importing an e60 file, if the box is checked for "Pavement data and associated families" under Tables to Import, the System Tables boxes gray out in order to maintain consistency in imported data.

The 5.3 Import screen is divided into four sections, File Selection, How to Import System Tables, Tables to Import and Working Status. In File Selection, click the Browse button for Import file name to specify the file to be imported. These include files with the formats e60 and e50 as well as e40. Select the type of file that you would like to import. Select the file. A second Browse button is associated with the Import path. The Import path refers to the location and name you wish to assign to the pavement data that is to be imported. When you identify a file for a database under the Import file name selection, the default name for the database is placed in the Import path box. Clicking the Browse button associated with the Import path opens the Open/Create Pavement Subdirectory form. You can edit this form to change the default selection. The form shows the default path to your pavement databases and provides a pick list of your existing pavement databases. You can select an existing database (in which case the data you are importing overwrites the existing database) or type in a new name, and the import file is copied to this new name.

The How to Import System Tables portion provides two options. The first allows the user to add only values from imported files that do not exist in their current System tables. The other option completely replaces the existing System Tables with those being imported. When using the second option, it is **STRONGLY recommended** that the user produce a backup of the existing System Tables.

Note

When importing e60 files, if the “Pavement Data and associated condition families” box is left unchecked under Tables to Import, the user may choose the data to import from the System Tables.

The Tables to Import provides several options as well. When importing an e60 file, the user has the option of selecting specific components of the System Tables to import. When importing an e50 file, the user has the option to import System Tables in their entirety or not at all.

Clicking on the Import button launches the import routine. If the import routine does not cause any existing data to be overwritten, the import procedure will proceed uninterrupted. If the import routine is configured such that it will overwrite existing data (either pavement data or system data) a Windows message box appears and presents you with three options: Abort to skip this file, Retry to overwrite the current file, and Ignore to overwrite all files. Select the appropriate choice.

When the import procedure is completed the PAVER status window shows a “Done” message. Click the Exit button to leave the 5.3 Import Window. The data you imported can be opened by choosing File... Open from the PAVER Menu. Select the imported database from the list of available PAVER databases.

Select file to import

Configure System Tables import options

PAVER 5.3 Import

File Selection

Import filename: C:\EMS Program Files\Nuser Data\NHPT\test.e60 Browse...

Destination path: C:\EMS PROGRAM FILES\USER DATA\ Interstate Files\ Browse...

How to Import System Tables

☒ ADD the values from the import file to the values in my system tables

☐ REPLACE the values in my system tables with those from the import file (USE WITH CAUTION!)

Tables to Import

☒ Pavement data and associated condition families ☒ System tables

☐ Include other (non-associated) condition families ☒ MLR Tables ☒ Condition Types and Categories

☐ Include images ☒ Inventory Picklists ☒ User-Defined Fields

☐ Condition Families ☐ User-Defined Reports

Working Status

Accomplished percentage: 0% 100%

Action: File: Table:

Import Close

Begin import process

Data Verification Tools

The Database Verification Tools are a good place to start when encountering errors. They are now available as an Inventory option in the Visual Menu. Each checkbox represents a separate segment of the verification process. They are as follows:

1 - Verify branch data and remove duplicate section data – Ensures that branch summaries correspond to section totals, that only one family model is assigned to each section, and that there is only one set of user-defined field data for each section.

2 - Verify section construction history - Ensures that the LCD (Last Construction Date) agrees with data in the Work History table.

3 - Verify /reset latest inspection indicators - Ensures data matches last inspection data.

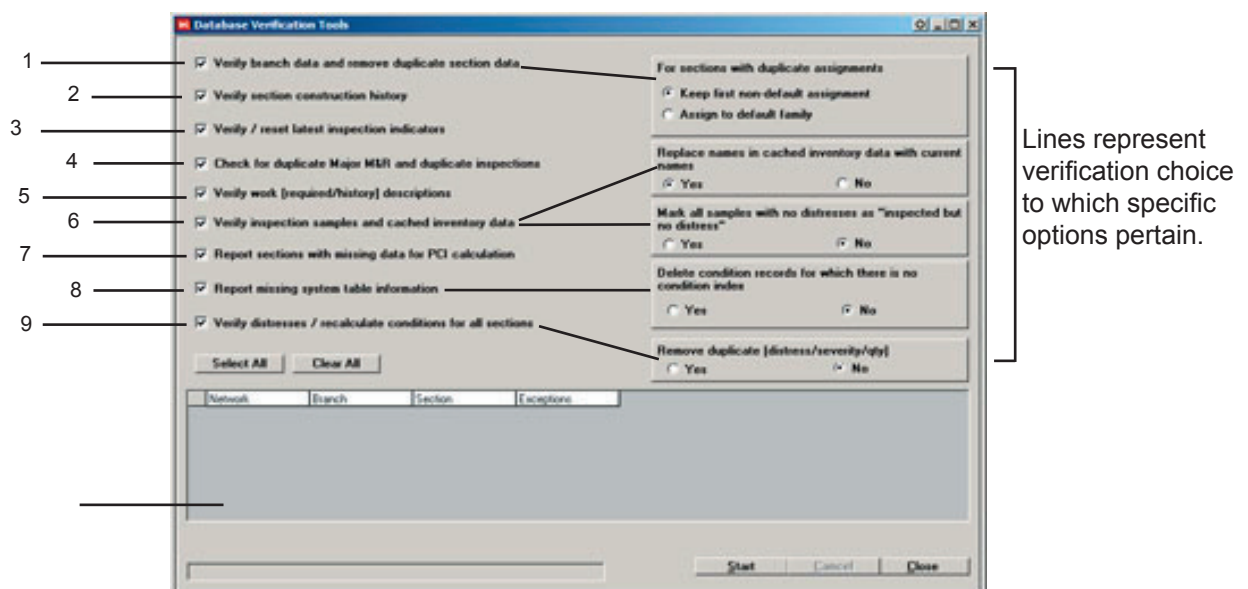
4 - Check for duplicate Major M&R and duplicate inspections - Eliminates duplicate Major M&R (i.e. same date, same work type) and duplicate inspections (i.e. same section, same PCI).

5 - Verify work [required/history] descriptions -Ensures that all work history and work required entries have a work type description. Reports sections and dates that have work codes no longer in the system tables.

6 - Verify inspection samples and cached inventory data- Ensures that all sample units either have distresses or are marked “inspected but no distresses”. Checks and fixes cached inventory data associated with inspections.

8 - Report missing system table information - Lists networks, branches and sections containing data that is missing from the system tables.

9 - Verify distresses and recalculate conditions for all sections -Reports invalid or incomplete distress entries. Recalculates PCI and other selected distress indices. For large databases, this option may take considerable time



Copy and Move Data

Note

When using **Move** command:

- You may only move one source to one destination.
- All *children* (sub-items within a section) move with the *parent*.

When using **Copy** command:

- You may copy one source to one or more destinations.
- You are given the choice to copy all *children* to the *parent*.

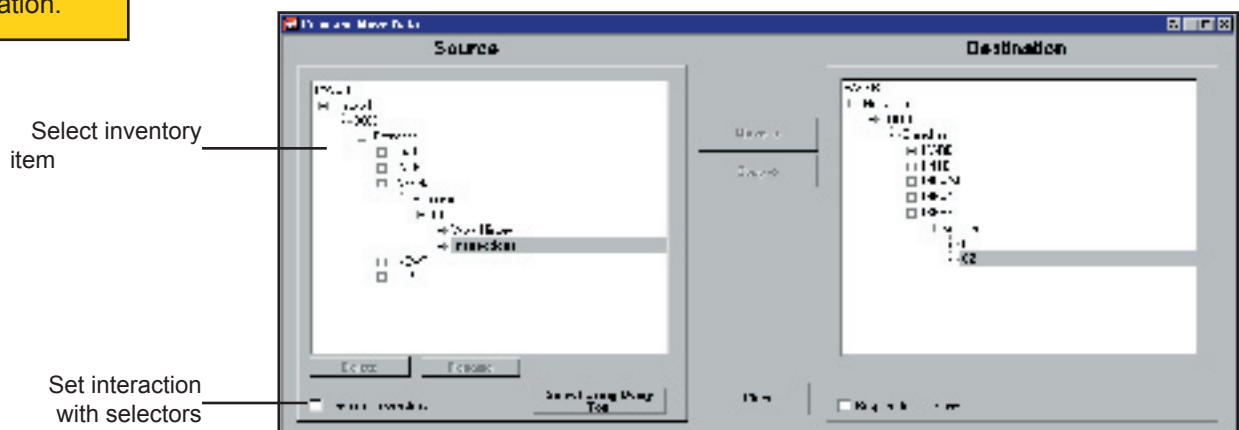
The Copy and Move Data tool is now available under Inventory in the Visual Menu. First, select the inventory item you wish to move or copy under Source. Then, select the Destination for the inventory item you wish to move or copy.

Move relocates the item to the specified location, while Copy leaves the original in its location and place a copy in the specified destination. The Move and Copy buttons remain “grayed out” until an acceptable combination of source and destination locations are chosen. For example, you cannot move a network into a section. All data movement is restricted within the open database. To move data items between databases, you will have to combine databases using Combine/Subset Database described in Database Tools-Combine/Subset Database on page 29. After two databases have been combined, move or copy the data items and split the database back into its original components.

The Copy and Move Data utility also allows you to delete and rename items by highlighting the appropriate item and clicking Delete or Rename under the Source side. Also, you can use the EMS Query Tool to eliminate any data you do not want to view by selecting Subset from the View box and clicking on Select. The Generate Selections and Respond to Selections check boxes link the Copy and Move utility with the other selector tools. For all components of PAVER that use inventory items (Network, Branch, and Section), there is one active selection. Therefore, you can use the Copy and Move utility to Generate selections in other inventory selectors or the Copy and Move can be selected to Respond to selections made by another selector.

Note

You may delete from Source, but not from Destination.



Edit Image Paths

Note

For more information about the **EMS Image Viewer**, see pages 60 and 61.

The Edit Image Paths tool, now available under Inventory in the Visual Menu, gives users the ability to change the image path for images that are not stored in the database, but are stored in a remote location. The path to the image is stored in PAVER when images are not stored in the database. This tool allows the user to edit what image path is stored in the database.

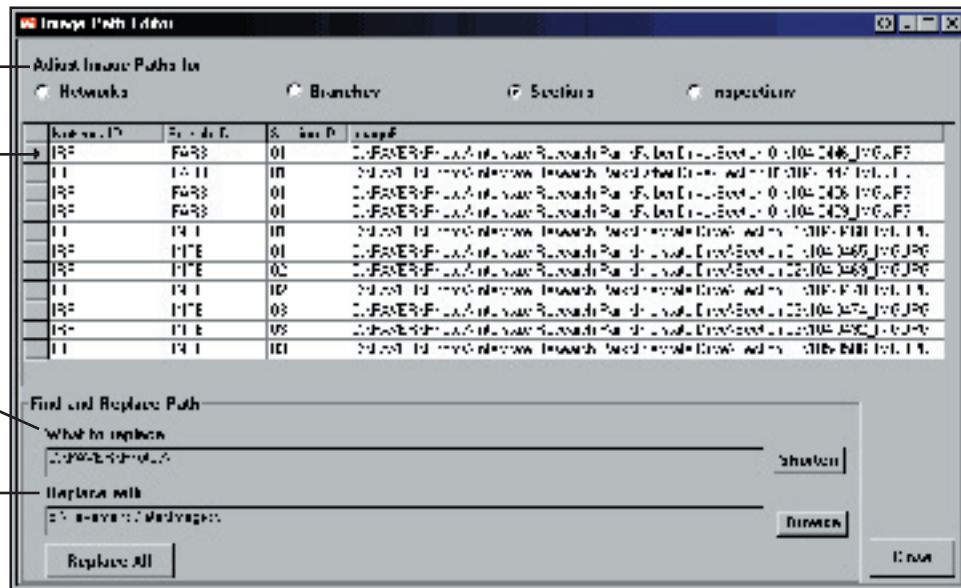
To begin, launch the Edit Image Paths tool from the Visual Menu under Database Tools. The image path can be adjusted for images stored at the Network, Branch, Section, and Inspection levels. All images stored at a specific level will be displayed in the table. To change the image path, first select the portion of the image path to be replaced in the What to replace box. The Shorten button shortens the path to be replaced on directory at a time. Once you have selected what is to be replaced, then select the new path in the Replace with box. The Browse button can be used to navigate to the new image location.

Select level with stored images

Table displays all images stored at selected level

Select portion of path to be replaced

Identify the new portion of the path



Edit Image Path Example

The following example displays how to correctly use the Edit Image Paths tool. In the above screen shot, the old image path was:

C:/PAVER/Photos/Interstate_Research_Park/Farber_Drive/Section01//*.jpg**

The new path is to be:

D:/Pavement_Data/Images/Interstate_Research_Park/Farber_Drive/Section01//*.jpg**

The portion of the path that needs to be replaced is in red. Under What to replace, the path should be shortened to “C:/PAVER/Photos”, and under Replace with the user should browse to the “D:/Pavement_Data/Images” folder. All instances of “C:/PAVER/Photos” will be replaced with “D:/Pavement_Data/Images”.

Note

You only need to replace the portion of the path that has changed in order to correctly modify the image path.

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GIS Tools

GIS Assignment Tool

Note

The GIS Assignment Tool introduced in Version 5.1 replaces the PAVERGIS add-in.

Previous versions of PAVER used the PAVERGIS Interface add-in to access GIS capabilities. However, GIS tools are substantially upgraded in PAVER 5.1 in that GIS capabilities come integrated in the software and are increasingly easy to operate and employ.

What is the GIS Assignment tool?

The GIS Assignment tool links the PAVER data for individual pavement sections to Geographical Information Systems (GIS) data. The GIS Assignment tool provides an internal ‘point-and-click’ interface to create, remove, or change the link between pavement sections and GIS map features. Using the same visual layout as the Selectors, the tool dramatically reduces the time required to create or change the link between GIS and pavement data. This tool is designed to work directly with the same ESRI shapefiles that are used in PAVER’s internal GIS capabilities.

Note

For GIS tools to work in PAVER, all polygons must have **no z axis values**. In PAVER, GIS is limited to the x-y plane.

Using the GIS Assignment selection tool

- Make sure the PAVER software is open with an active database. If a new database is not opened, PAVER will access the database used most recently by this machine.
- To practice using the GIS Assignment tool, open the SAMPLE.pvr sample database that should have been installed in the User Data folder with your installation of PAVER 5.3. To find the User Data folder, go to C:\
- Click the Visual Menu icon in the PAVER toolbar to open the Visual Menu dialog box.
- Select the “Selectors” option in the left section of the Visual Menu dialog box. A menu of options will appear in the right section of the Visual Menu dialog box.
- Choose the “GIS Assignment tool” option in the right section of the Visual Menu dialog box.
- Click the “Continue” button to open the GIS Assignment dialog box.

- If the GIS data is correctly associated to the PAVER database, the GIS Assignment tool dialog box that opens will contain both a tree listing of all pavement sections in the database, hereafter called the PAVER tree menu, as well as a graphical representation of the base, hereafter called the GIS map. [NOTE: For instructions on how to associate a GIS shapefile to a particular PAVER Database, see the Shapefile Conversion Tool under Add-Ins.]

- The PAVER tree menu is a tree listing of the Networks, Branches and Sections that are entered in the active PAVER database. Each pavement section has a unique identification associated with it in PAVER. This unique identification is used to link the GIS features to the pavement sections. As a result, the link will be automatically maintained even if the network, branch, or section identifications change.

GIS Assignment Tool Button Functions

The following tools, which are located at the top of the GIS Assignment tool dialog box, allow you to associate the PAVER data with the GIS map and to customize your view of the GIS map for easy use:

1. The **center** tool will zoom to the original view of the entire GIS map and will center the map on the screen. To use the center tool, simply click the “Center” button. For all GIS tools, the term “click” shall indicate that the left button on the mouse is used.
2. The **pan** tool allows you to move your view of the GIS map while maintaining the current zoom factor. To use the pan tool, click the pan button. The mouse icon will become a double arrow. Find the spot on the map you would like to move and place the double arrow over it. Click and hold down the left button on your mouse, move the double arrow to a new location and release. The view window of the GIS map will move so that the point first selected is moved to the point of release. The pan tool will continue to be selected, and may be used again, until you select another tool.
3. The **select** tool is the primary function of the GIS tools. It allows you to do any of the following: (1) to determine the PAVER section identification of a section on the GIS map, (2) to determine the location on the GIS map of a PAVER section, (3) to newly assign a PAVER section identification to a section on the GIS map, (4) to change the current PAVER section identification assignment of a section on the GIS map. The GIS map of the base assigns different colors to sections with different linkage distinctions. Specifically, areas represented in **green** are assigned to a pavement section in the database, while areas represented in **yellow** are *not* assigned to a pavement section. Sections represented in **red** identify the section(s) that are current or active. The current section(s) will normally be highlighted in the PAVER tree menu. The select tool will continue to be active, and may be used again, until you select another tool.

Note

The colored hatches have different meanings. **Green** is an assigned section, **Yellow** is an unassigned section, and **Red** is the active and assigned section.

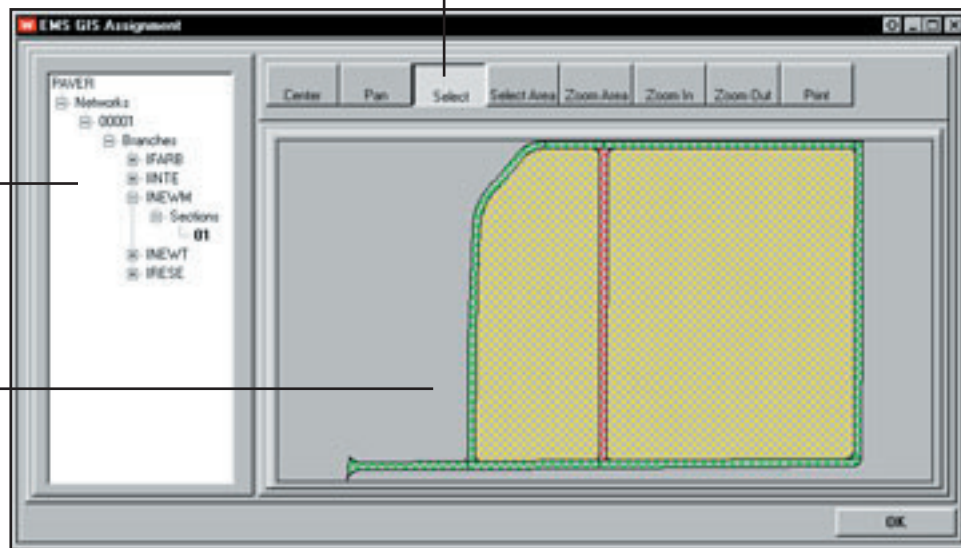
(1) to determine the PAVER section identification of a section on the GIS map

To use the select tool, click on the button marked “Select”. The mouse icon will change to an arrow and a question mark. Click on a **green** section and that **green** section will become current, changing the color to **red**, while the corresponding section identification will be automatically highlighted in the tree menu to the left.

The **select** tool is used to assign or *unassign* sections.

The tree is used with the select tool to assign sections.

Green sections are assigned, Red sections are active, and Yellow sections are not assigned.



(2) to determine the location on the GIS map of a PAVER section

At any time, whether the select tool is active or not, click on a section identification in the PAVER tree menu, and the corresponding area(s) will be highlighted in **red** on the GIS map. This section and all these areas associated with this particular section identification will become active.

(3) to newly assign a PAVER section identification to a section on the GIS map.

Verify that the select tool is active. If it is not, click on the select button. Click on the area you want to assign a PAVER section identification to, so that is shown as current. This section will therefore be **red**. Next, click on the section identification you want to be associated with the section.

It is possible, and often desirable, to include more than one area in one section identification. You may add an additional area to a section by highlighting the particular section identification in the PAVER tree menu and by clicking on another area, so that it is current. The additional area will be added to the section and any previous areas associated with the section identification will remain associated.

(4) to change the current PAVER section identification assignment of a section on the GIS map.

Click on an area that was **green** and is now **red** and that area will turn yellow and will no longer be associated with any pavement sections. Click on a **yellow** area, and that area will become **red**, indicating that it is now an area associated with the current section. The current section(s), or any section represented in **red**, will always be assigned to a section, therefore when another section becomes current, the original **red** section will change to **green** and will be associated with the section that was highlighted last in the PAVER tree menu. Click on a new section in the PAVER tree menu, to change the section identification assignment of the current, or **red** section.

Note

The GIS assignment tool has the same buttons found on the GIS and Tree/GIS selectors.

4. The **select area** tool allows you to determine the PAVER section identification of a section on the GIS map without changing the assignment of the active area or the current section or the association of an area to a section identification. To operate the select area tool, click on the select area button. Click on any section of any color and the corresponding section will be highlighted in the PAVER tree menu. The select area tool will continue to be active, and may be used again, until you select another tool.

5. The **zoom area** tool allows you to change the zoom factor of the GIS map and allows you to zoom in on a specific area quickly. To use the zoom area tool, click on the “Zoom Area” button. The mouse icon will become a cross. Position the intersection of the cross at one corner of the desired window, click and hold the left button on the mouse and drag it to the opposite corner of the desired window, creating a box outline. If you begin the zoom window at the upper-left corner, you will drag to the bottom-right and vice versa. If you begin the zoom window at the upper-right corner, you will drag to the bottom-left and vice versa. Release the right button on the mouse and the GIS map will automatically zoom to the largest view that includes everything in your zoom window. The zoom area tool will continue to be active, and may be used again, until you select another tool. To decrease the zoom factor, you will have to either use the center tool, and start over, or use the zoom in tool.

6. The **zoom in** tool allows you to zoom in on a specific location. To use the zoom in tool, click on the “Zoom In” button. The mouse icon will become an **arrow**. Position the tip of the arrow over the point you want to zoom in on, and click the left button on the mouse. The GIS map view will decrease, as the scale of the map increases at scale factor of **2:1**. The new view window will be centered on the tip of the arrow. The zoom in tool will continue to be active, and may be used again, until you select another tool.

7. The **zoom out** tool allows you to zoom in on a specific location. To use the zoom out tool, click on the “Zoom Out” button. The mouse icon will become an **arrow**. Position the tip of the arrow over the point you want to zoom out of, and click the left button on the mouse. The GIS map view will increase, as the scale of the map decreases at scale factor of **2:1**. The new view window will be centered on the tip of the arrow. The zoom in tool will continue to be active, and may be used again, until you select another tool.

8. The **print tool** allows the user to print a hard copy of the GIS map. To use the print tool, simply click the button marked “Print”. The default print setup will print the entire GIS map only on a letter size sheet to the default printer. The print setup may be changed, using the File, Printer Setup menu.

PAVER Shapefile Converter

Note

When converting shapefiles, the database that is to be associated with the shapefile must be online for the procedure to work correctly.

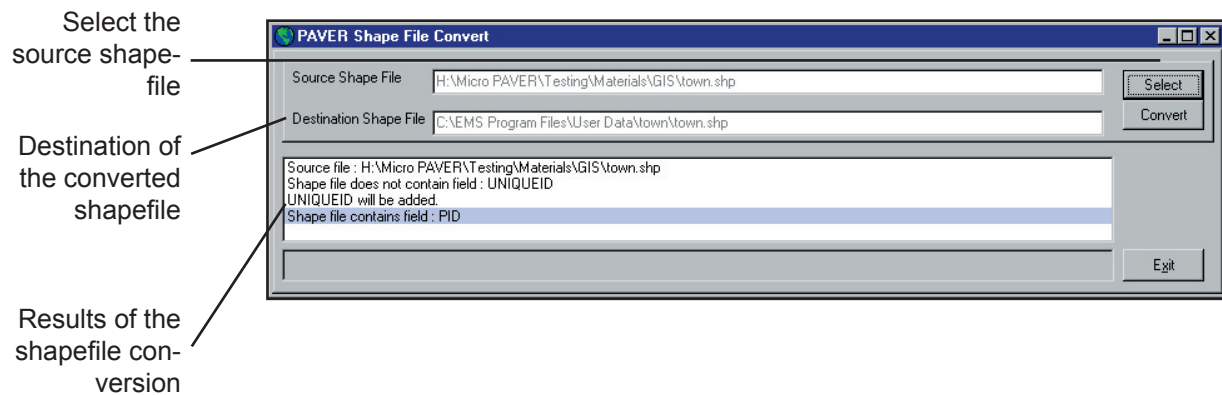
Additionally, all the files that go with the shapefile (*.shp, *.dbf, *.sbn, and *.shx) must be in the same folder when converting.

Converting from PAVER 4.x to 5.3

The **PAVER Shapefile Converter** is used to convert shapefiles that were used in version 4.x of PAVER to be used in version 5.3 of PAVER. The difference between shapefiles in version 4.x and version 5.3 is that in 5.3 shapefiles now contain a Unique ID. The conversion of the shapefile will check to see if the file contains a Unique ID and add the field, if necessary. Converting coverages from PAVER 4.x to 5.3 is a two step process. You must first take the PAVER 4.x coverage file into ArcView and convert the *.cov file to a shapefile (*.shp). To complete the process, the shapefile must be converted using the **PAVER Shapefile Converter**. Once the shapefile is converted, the process is completed.

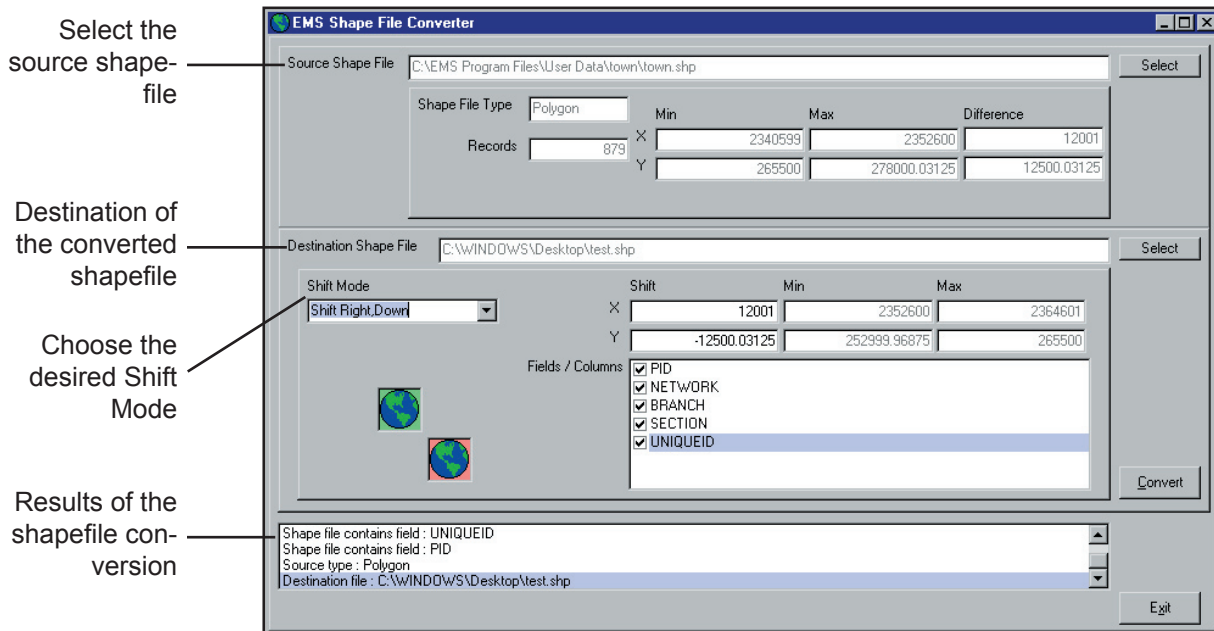
Shapefile Conversion Procedure

The **PAVER Shapefile Converter** module contains three sections. The first section displays the **Source Shapefile**, the second section displays the **Destination Shapefile**, and the third section displays the results of the conversion process. You must first locate the shapefile you wish to convert. This is done by clicking the **Select** button to browse your computer for appropriate files. Once the file is selected, PAVER then checks that the file contains a UNIQUEID and PID. PAVER also automatically sets the destination of the converted file in the folder for the online database. To complete the conversion process click the **Convert** button. As the conversion takes place, the results will be shown in the lower window.



Shapefile Coordinate Shift

The **Shapefile Coordinate Shift** module functions like the PAVER Shapefile Converter discussed above. However, this module also allows you to shift the coordinates of the shapefile during conversion. Similarly, the **Shapefile Coordinate Shift** is also divided into three sections. The first section displays the **Source Shapefile**, the second section displays the **Destination Shapefile**, and the third section displays the results of the conversion process. You must first locate the shapefile you wish to convert. This is done by clicking the **Select** button to browse your computer for appropriate files.



Once the file is selected, PAVER then checks that the file contains a **UNIQUEID** and **PID**. The coordinates of the selected shapefile are displayed. Once the file is loaded, you may then click the **Select** button in the **Destination Shapefile** area of the box. After selecting the destination file you are then able to select the appropriate **Shift Mode** for the converted shapefile. You may select a premade shift mode or a **User Specified** shift mode from the drop down box. To complete the conversion process click the **Convert** button. As the conversion takes place, the results will be shown in the lower window.

Selectors

Navigating the Pavement Inventory

PAVER provides several options for choosing the portion of inventory with which the user wants to work. These “selectors” make moving from one part of the inventory to another quick and easy. The selectors are accessed directly from the Selection buttons on the main toolbar or by going into the Visual Menu and choosing Selectors. Other parts of the program that require the user to specify a component of the inventory (i.e. Network, Branch, Section) respond to the input received from the selector tools. There are four selectors: Tree, Tab, GIS, and List. A combination of two, referred to as Tree/GIS, can also be used.

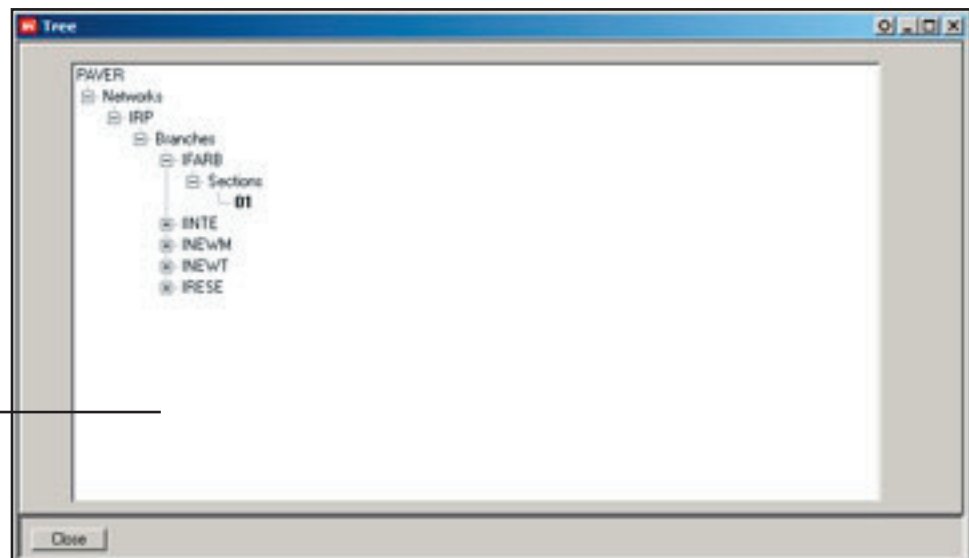
The Tree Selector

Since the inventory in PAVER is represented in a hierarchy similar to the file structure in Windows, it is logical to navigate this structure in a tree format. Much like the Explorer tool in Windows, the Tree selector allows you to move through the hierarchy of your database and select the specific Network, Branch or Section from which information is needed. This is done by moving down the “tree” until you arrive at the desired location.

Note

For databases with more than 500 Branches, the **Tree selector** may experience very long load times. It is recommended that you either split the database or use a different selector.

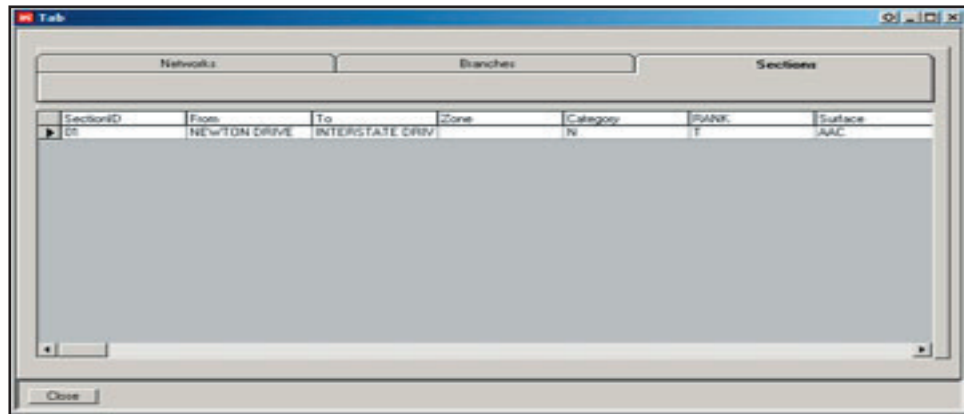
Navigate through
tree structure



The Tab Selector

For those who like the PAVER 4.2 method of selecting inventory items by selecting from the Network, Branch and Section file cards, the Tab Selector has a similar look and feel. Starting with the Network tab and working across to the Branch and Section tabs, the user can select and view data at any level of the inventory. Along with selection capability, all data contained at each level can be viewed directly from the same window the selection is made. Unique ID numbers and user defined sort field data are also now available for viewing with this selector.

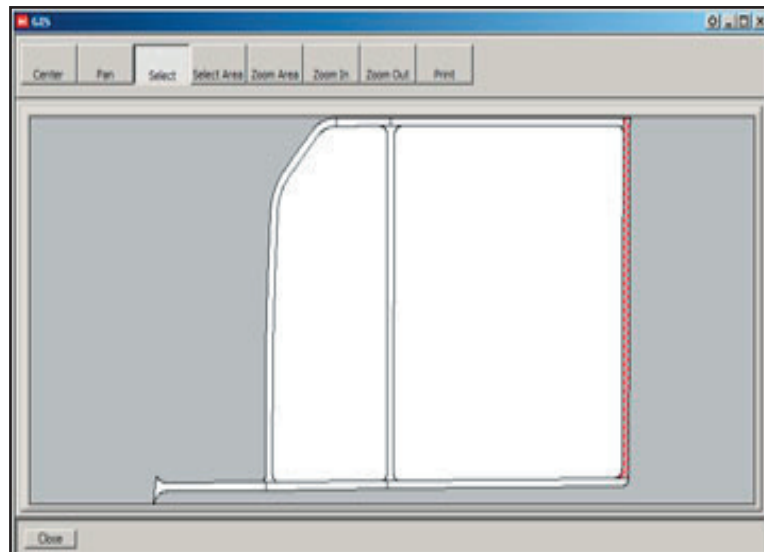
Navigate inventory with tabbed index cards to find selection



The GIS Selector

Because GIS has become more integrated into Micro PAVER, the user can now select an inventory item by using a GIS coverage. This first requires the database to be linked to a coverage via the PAVER GIS process. Once the GIS link has been completed, the map can be viewed via the GIS Selector. By simply pointing and clicking on any polygon (or arc) in the coverage, the selector makes the link to that section. Like the Tree Selector, the GIS Selector only allows selection. No data is displayed.

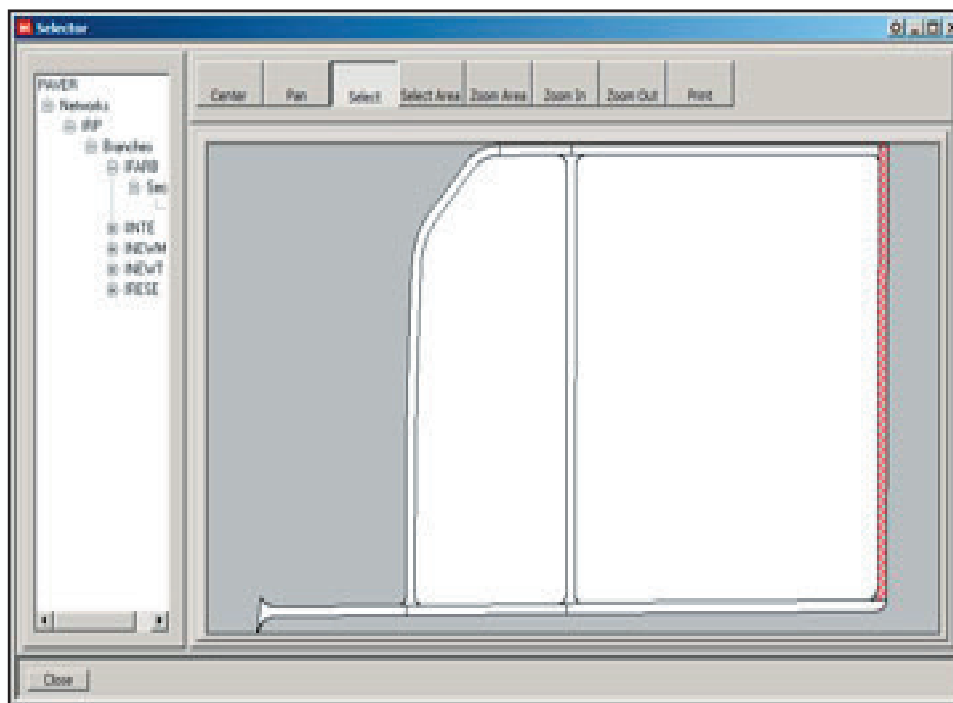
Locate an inventory item by selecting it via GIS



The Tree and GIS Selector

The Tree/GIS Selector is simply a combination of the Tree and GIS Selectors both displayed in one window. This allows you to select an inventory item using the easiest method for the particular inventory item. For example, if you know only the location of the pavement, the GIS Selector is most useful. If you need to trace through the hierarchy, the Tree Selector is the logical choice. The Tree and GIS Selector combines both of these features into one compact tool.

Selecting an inventory item with the tree is aided by GIS



The List Selector

The last choice from the Selectors menu is the List Selector. This is the same selection tool used in Inventory management which is discussed in the next section.



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Inventory

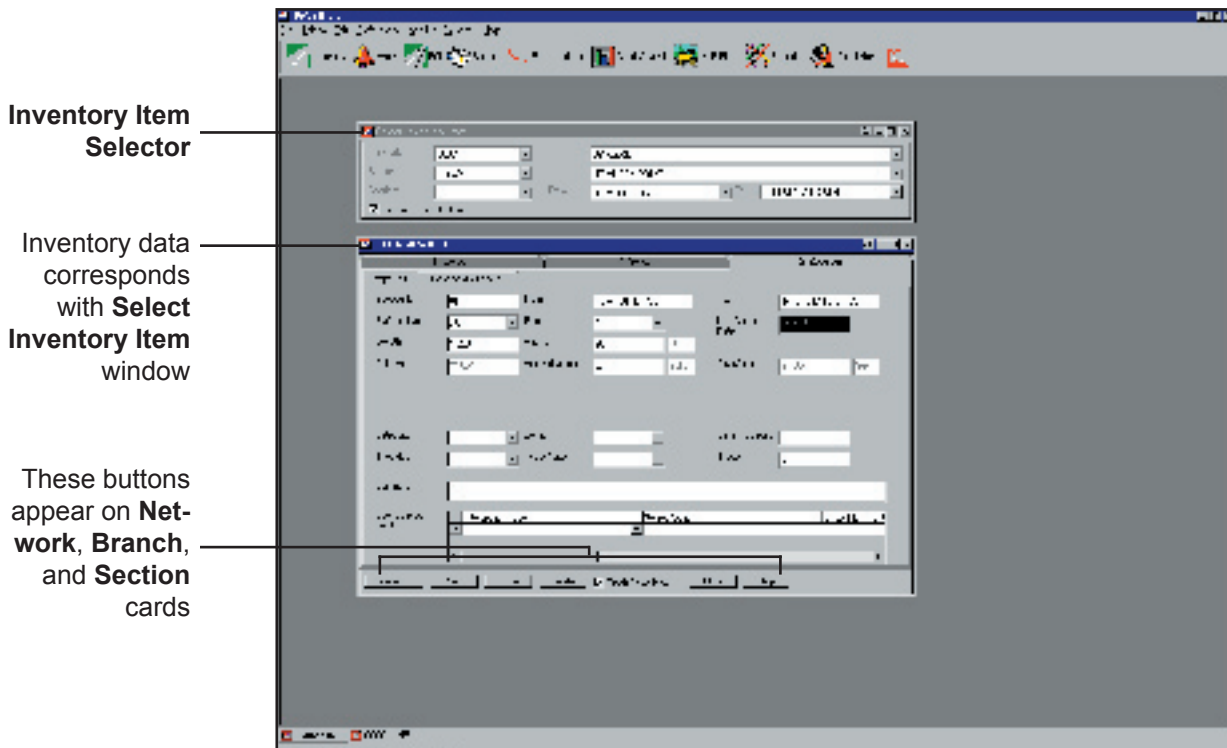
Definition

Managing Pavement Inventory - Basic Operations

The Inventory button provides tools to view, edit, and define pavement networks. Clicking on the Inventory button opens two windows.

The Select Inventory Item window is a series of drop-down boxes that allow you to navigate to a specific point in the inventory. Select the particular inventory item by working down the hierarchy of the database, from network to branch, then to section. At each level, you can select an item via ID or Name.

The larger window is the inventory data window. In this window, you can edit inventory data. To access data for a particular level, click the tab for Network, Branch or Section. In order to change the displayed inventory item, locate the item in the Select Inventory Item window. The inventory data window updates itself accordingly.



At the bottom of the inventory data card, there is a check box for Track Selection. If this box is not checked, the inventory data card will not change when a new inventory item is chosen in the Select Inventory Item window.

You may move to different fields on the inventory data form by clicking on the field you wish to edit in order to enter information. You may also move from field to field on the form by pressing the tab key. Each press of the tab key shifts the selected field once to the right. Once the end of a row has been reached, a press of the tab key shifts the selected field down one row to the furthest left field.

Data fields in PAVER 5.2 only accept entries of a determined type of characters. For example, a distance field can contain only numeric information. If you try to enter non-numeric characters into a distance field, the program will not accept your entry.

Note

To view data for a specific network, it must be chosen in one of the **Inventory Item Selectors**.

Each of the inventory cards (Network, Branch, and Section) have six buttons along the bottom of the form. The New button is for adding new inventory items. The Copy button is used to create a new network, branch, or section identical to the selected network, branch, or section except that the Network, Branch or Section ID will include the characters “CC” to indicate that it is a copy. None of the copied network’s children (branches and sections) are copied when a network is copied. Likewise, when a branch is copied, none of its sections are copied.

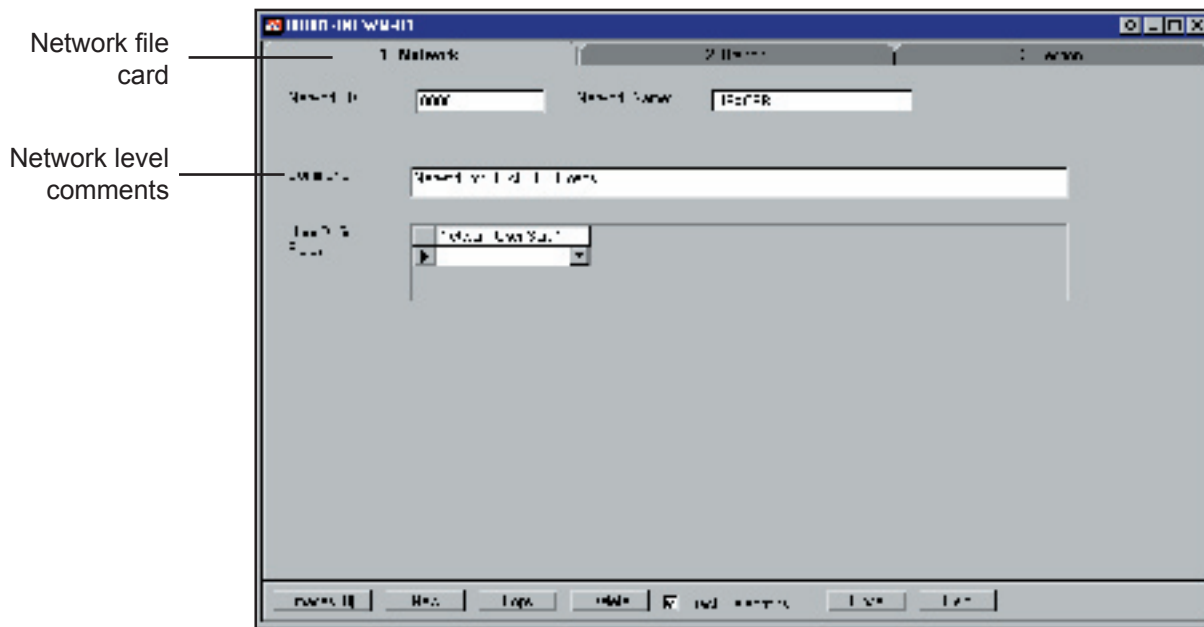
Clicking the Delete button deletes the selected network. The Help button starts the PAVER help system. Pictures launches the EMS Image Viewer. For more instructions on the use of this, please see [EMS Image Viewer](#). The Close button closes the Inventory program.

You may also assign values for the user defined fields. This can be done only when the parameters for the user defined fields have been established (See [System Tables-Define User Fields](#)). Once this is done, the inventory can be sorted based on user defined criteria for many applications in PAVER.

Creating a Network

The first step in building a pavement inventory for a military installation, city, or airport is to create a network. A hierarchical structure exists for pavement inventory items in PAVER 5.0. Networks are the parents of branches, and in turn branches are the parents of sections. In order to create pavement branches and sections, you must first create a network.

To create a network, click on the Inventory button on the PAVER button bar. The inventory data form appears with the Network file card displayed. Click the New button at the bottom of the Network file card, which populates all fields identifying the current network. The fields on the network form for Network ID, Name, and Comments should be edited to the desired values. You may also enter data in any User Defined Fields that you have created. See the above section on how to use the functions located at the bottom of the inventory file cards.



Creating Branches

To create a branch, click the Inventory button on the PAVER button bar. The inventory data window appears with the Network file card displayed. Click the file card tab 2. Branch for access to the Branch file card. If you have just added a new network, that network will have no branches defined. Click the New button at the bottom of the file card to enter a new branch. The fields on the branch data entry form becomes populated with the label “new” or is blank (depending on the type of field, i.e., text, numeric, or pick list). Enter the appropriate values. Some fields are locked. They automatically respond to section data once sections for the branch are created. For more specific information on how to use the functions located at the bottom of the Branch card, see the section on [Managing Pavement Inventory](#).

Note

You may add items to the **Use** pick list under **Define User Fields** in [System Tables](#) if the choices are not adequate.

The contents of the Use field are limited to a single value that is selected from a preexisting list of choices. To enter a value in the Use field, select the field. A down arrow appears on the right side of the field data entry area. Click once on the arrow and a list of available choices appears in a scrolling pick list. Select an item from the list by pointing to the item with the mouse and pressing the left mouse button.

If there are more items in the list than can be shown in a single short list (usually 5 to 10 items), the list is displayed with a scroll bar arranged along the right side of the list. To select an item not visible in the list, point to the scroll bar down arrow with the mouse and press the left mouse button. The list scrolls down. To scroll back up the list, point to the up arrow on the scroll bar and press the left mouse button. When the pick list is very long, you may want to locate items in the list by typing the first character of your selection. The program seeks out matches for the characters you type. To use the seek feature, select the pick list field you wish to edit and type the first character of the selection you want and the pick list moves to the characters you type.

If the pick list does not contain the item you wish to enter, you need to add the item to the pick list. To enter a new item to the Use pick list, select Tables from the PAVER Menu located along the top of the PAVER screen. From the Tables sub-menu, select the Inventory Pick List selection and then the Branch Use tab. See the [System Tables](#) section under [Inventory Pick Lists](#) for further instructions.

The Branch file card contains three area fields: Sum of Sect. True Area, Area Adjustment, and True Area. The Sum of Sect. True Area field is the sum of true section areas of the branch. The Area Adjustment field is used to reflect special knowledge you have about branch area that is not incorporated in the Sum of Sect. True Area. Decreases in branch area should be entered as negative values. Note that the Section card also has an area adjustment field (Section Area Adjustment) so you do not need to reflect section level area adjustments in the branch Area Adjustment field. True Area is Sum of Sect. True Area plus Area Adjustment. True Area is the value used in PAVER calculations and reports.

Branch file card

You may create your own branch uses if **Use** options are not adequate

These fields may be configured by the user

Creating Sections

To create a section, click on the Inventory button on the PAVER button bar. The inventory data form appears with the Network file card as the active form. Click the file card tab 3. Section to make the Section data card the active form. If you have just added a new branch, that branch will have no sections defined.

Click the New button at the bottom of the screen to enter a section. Enter section information in the rows of fields starting with Section ID. The Calculated Area is calculated based on the Length and Width information you enter. The Calculated Area field cannot be edited. The True Area field defaults to the value in the Calculated Area field. However, this value can be adjusted to reflect cut outs or other adjustments affecting the actual section area in the Area Adjustment field. Although the Area Adjustment field is useful for irregularly

shaped sections, you must still enter Length and Width information. Failure to do so will create problems in other functions of PAVER. If the true area of a section is known, the True Area field may be edited directly. PAVER will then calculate the Area Adjustment.

The Unit field cannot be directly edited by the user (see System Tables section under Misc. Other Tables/ Unit of Measure (Field) Settings on page for details).

Some of the section fields can only be changed using the choices in the pick lists. Pick list choices can be edited or expanded through the Tables button above the PAVER button bar. (See System Tables section under Inventory Pick Lists on page 41 for further directions.) After the basic section information, there are two boxes, Conditions and Families. Condition information cannot be edited from the Section file card. Condition information can be entered in the routines run from the Field Inspect button on the PAVER button bar. The family assignment for the section (or other sections) can be changed by using the mouse to point at the Family box and double clicking the left mouse button. Family information can also be assigned under the Pred. Model button.

The Section file card contains three area fields, Calc (Calculated) Area, Area Adjustment, and True Area. The Calc Area field is the product of the section's length times width. The section Area Adjustment field is used to reflect special knowledge you have about section area that is not incorporated in the area calculation. Decreases in section area resulting from items like cut outs should be entered as negative values. Note that the Branch file card also has an area adjustment field (Area Adjustment) so you do not need to reflect Branch level area adjustments in the section Area Adjustment field. Calc Area and Area Adjustment are added to obtain True Area. True Area is the value used in PAVER calculations and reports.

Three user defined section fields are arranged along the bottom of the screen. These fields are used to contain user defined inventory information and can be used to sort and select inventory, maintenance, and inspection information.

Section file card

Use Area Adjustment to reflect cut outs or enter the True Area and PAVER will automatically calculate the Area Adjustment.

Conditions/Families

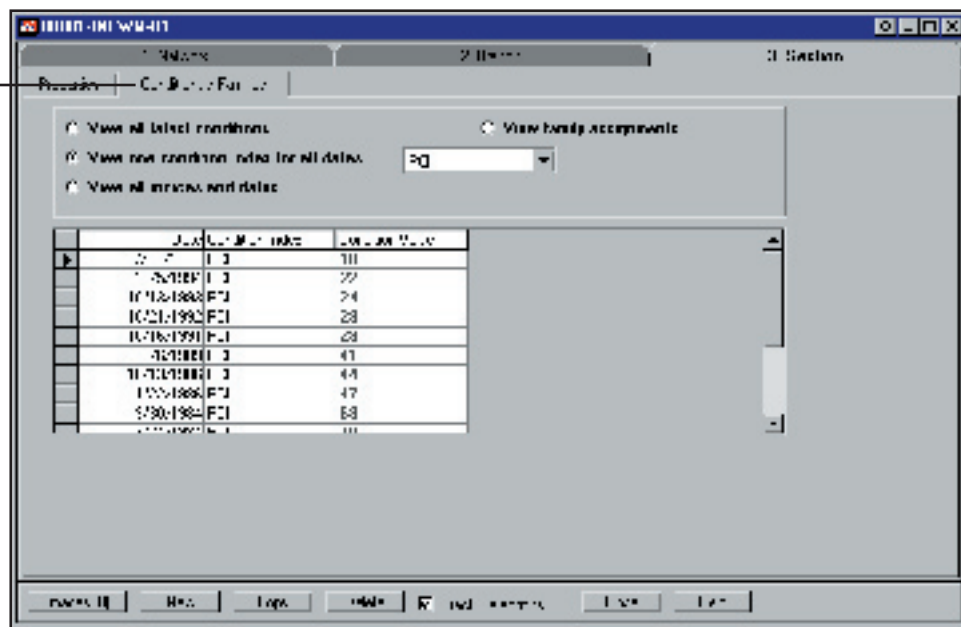
This tab provides a quick reference to condition and family assignment data for the selected section in four preset views:

- View all latest conditions – This produces a table with the latest (last computed or last entered) condition indices associated with this section.
- View one condition index for all dates – This shows every date that one selected index occurred for the current section. A drop down-box allows you to choose the condition for which you would like to display information.
- View all indices and dates – This is the complete listing of every condition index for every date occurrence listed in the section history.
- View family assignments – This shows what the current family assignment (Prediction Model) is for the selected section. Double clicking in the Family column opens the Change Family Assignments window, providing you the option to change the family assignment.

As with other tables in PAVER, right clicking on any of these tables will allow you to revise the table layout, sort the data, print, or export the data.

Condition and Age Categories, Condition Type Selection, and User-Defined Distress Indices are all discussed in System tables under Condition Types.

View the conditions and family assignments for a section



Note

The **Conditions/Families** tab provides a quick way to see the conditions associated with all construction and inspection dates.

EMS Image Viewer

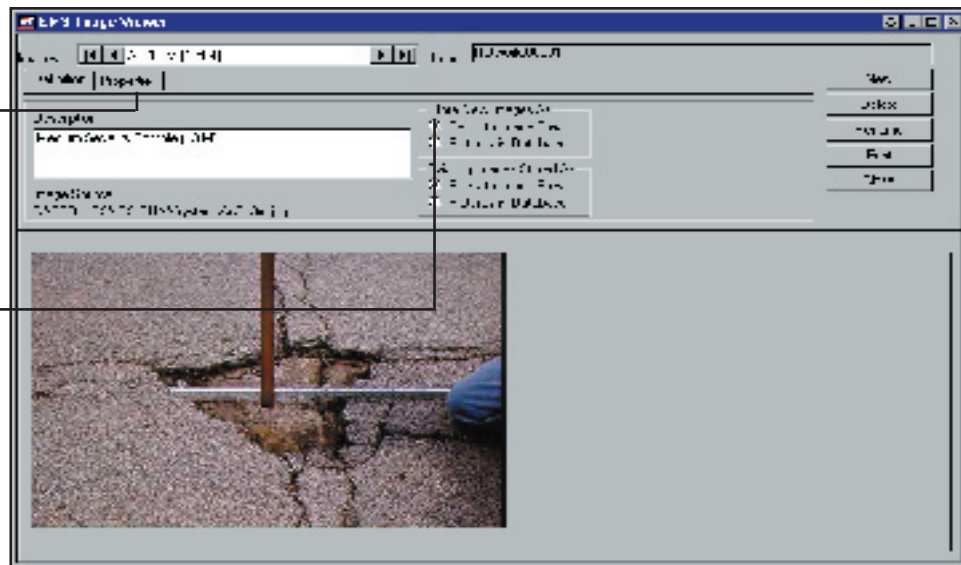
Note

Use the **EMS Image Viewer** to store relevant pictures such as distresses or individual sections.

The EMS Image Viewer manages the saving, recalling, viewing, and enhancing of pictures, drawings, and other stored images in the PAVER program. The EMS Image Viewer is accessed from the Inventory section of PAVER 5.2. The network, branch, and section cards of the Inventory program each have a button located along the bottom of the form labeled Images. In order to edit pictures for a specific network, branch or section, the item must be actively displayed in the inventory data window at this time. To open the EMS Image Viewer, click on the Images button.

Adjust images or add special effects

Edit how images are stored



Store an Image

Note

For information on how to **Edit Image Paths**, see page 43.

In the EMS Image Viewer window, there is a box titled Store New Images As. The options offered for storage are Paths to Image Files or Pictures in Database. Since image files are typically large, including them in the database substantially increases the size of a database. An alternative is to attach the picture to the database through a “path” to the image. The image would be stored in a fixed location, and PAVER would simply set up a path link to the image. However, an image stored as a path will not be included in the e50 file when the e50 is created for storage or transfer. In order for the images to follow the database, you will need to copy and send the images separately, making sure to place them in the same path on the new machine as they were in on the original. Select appropriate storage option and click on the New button. You are prompted to select the file containing the picture you wish to load. The drop box at the bottom of the window is used to specify the format for the picture. PAVER supports images stored in JPG, TIF, GIF, BMP, TGA, PCX, and PCT formats. Once you have selected the image file to add, use your mouse to click the Open button. The image appears in the EMS Image Viewer window.

If you wish to change the storage option for an image later, select the image and change the selection in the box titled Existing Images Stored As.

Viewing Images

To view and select an image from the list of saved images, use the scrolling tool at the top of the window. If you add only one image for an inventory item, it always appears in the EMS Image Viewer window when you access the EMS Image Viewer for that inventory item. However, you may associate more than one image with an inventory item. When multiple inventory images are associated with an inventory item, you can scroll through the images by clicking the image scroll buttons located on the upper left corner of the EMS Image Viewer window.

Edit an Image

There are two tabs in the EMS Image Viewer window, Definition and Properties. Clicking on the Definition tab allows you to view the selected image and to determine how the image is stored. Clicking on the Properties tab will allow you to make various graphic adjustments to the image as well as add a variety of special effects. Click on Edit for the desired feature and click on OK once you have made your adjustments. A preview of the image will be shown in the EMS Image Viewer window. Save changes by clicking on Save Edits or restore the original image if the change is undesirable by clicking on Restore Image.

Other Image File Options

Five other commands are available in the EMS Image Viewer window:

- **New** - A new image is attached to the network, branch, or section that was active when the Image command was invoked.
- **Delete** - The current image in the viewer is deleted.
- **Rename** - This renames the image within the viewer, but it will not change the file name.
- **Print** - This command invokes the Windows “Print” window for printing a copy of the selected image
- **Close** - This closes the EMS Image Viewer window.

Additional Field Data (Traffic, Test, Work Data)

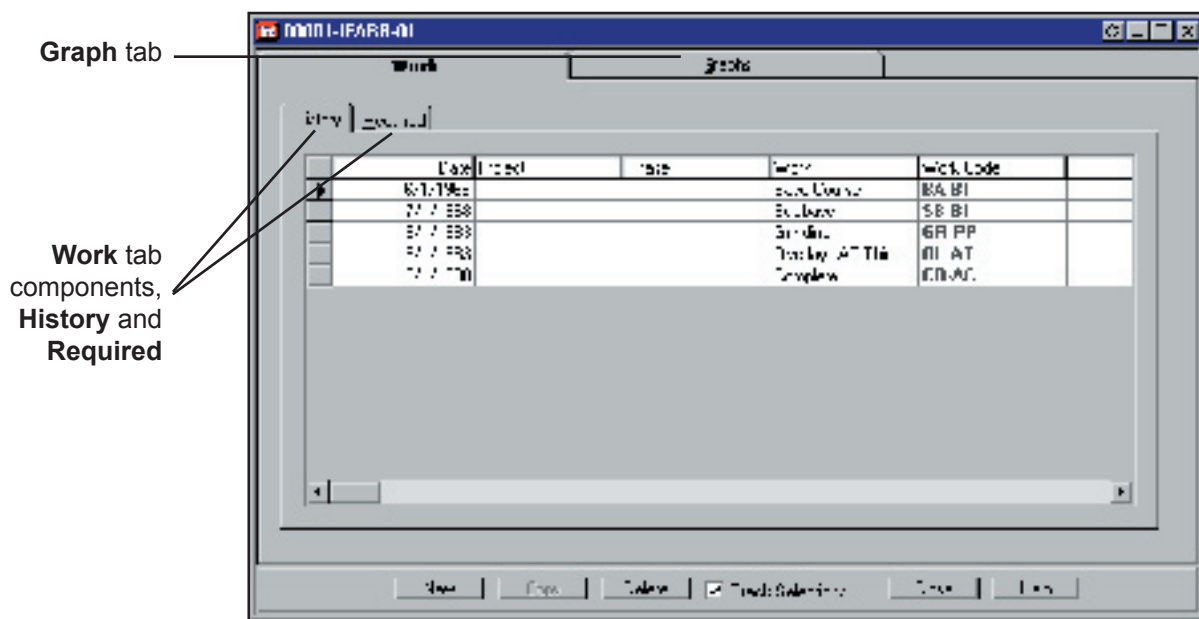
Work

Extensive connections exist in PAVER between construction date and predicted PCI. The system must have an accurate account of the last construction date for each section in order to accurately predict future pavement performance, maintenance requirements, costs, and inspection schedule. PAVER updates the last construction date for the section to correspond with the most recent major M&R. The Work History and Required forms provide an interface for easily entering work history data of a particular pavement section. In order to enter work information for a particular section, it must be selected in the Select Inventory Item window.

For a new record, click on New, then enter the information either by typing or selecting from a pick list of options. You may edit entries by typing over those in existence. Micro PAVER does not allow the user to delete ALL of the construction dates in a work history profile. If there is only one construction date, the entry cannot be removed. The Copy button invokes the Copy and Move Data utility - described in a following paragraph - and can be used to move other data elements, to compatible places in other areas of the database. In this case, work records will be copied or moved.

Maintenance, repair, and construction activity information is recorded on the Work file card. The Work table is subdivided into History and Required tables. Future or planned work is entered into the Required table. When the activity has been completed, scroll to the last column of the Required table and change the Work Completed field in the Work Required table to indicate Yes. This will cause the record to be transferred to the Work History table. If you select the History tab, the table refreshes and the completed work activity will then be part of the Work History.

The Graphs tab also contains a graphic component that presents graphs for each section relating condition and work history.



Traffic

This window is for entering previously collected traffic data. The Traffic table has a special copy feature for replicating information to multiple sections. Click the Copy traffic to rest of branch button to copy the information for the active traffic section to the other sections in the branch.

NDT and Test

This window contains two tabs, NDT Tests and Other Tests. These tables are for the collection of basic pavement test results.

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Inspection

PCI and Distress Indices

Field Inspection - Basic Operations

Collecting and recording of field inspection data are probably the most frequently repeated tasks in PAVER. The **Inspection** component of PAVER can be launched from the **Visual Menu** under **Inspection** or from the **PAVER Button Bar** via **PCI**.

Entering Inspection Dates and Samples

To enter inspection information, first verify that the desired network/branch/section is selected using the **Select Inventory Item** window. Notice that the name of the window corresponds to the network/branch/section that is currently selected. The **Inspection** drop-down box allows you to select a previous inspection by the inspection date. This is useful if you need to add or edit information for a previous inspection. If you wish to enter information for a new inspection, click the **Edit** button next to the **Inspection** window. The **Inspections** window appears, displaying a list of past inspections. Click the **New** button and a new inspection, with the current date, appears at the top of the list.

Select
Inventory Item
window

Create a new
inspection

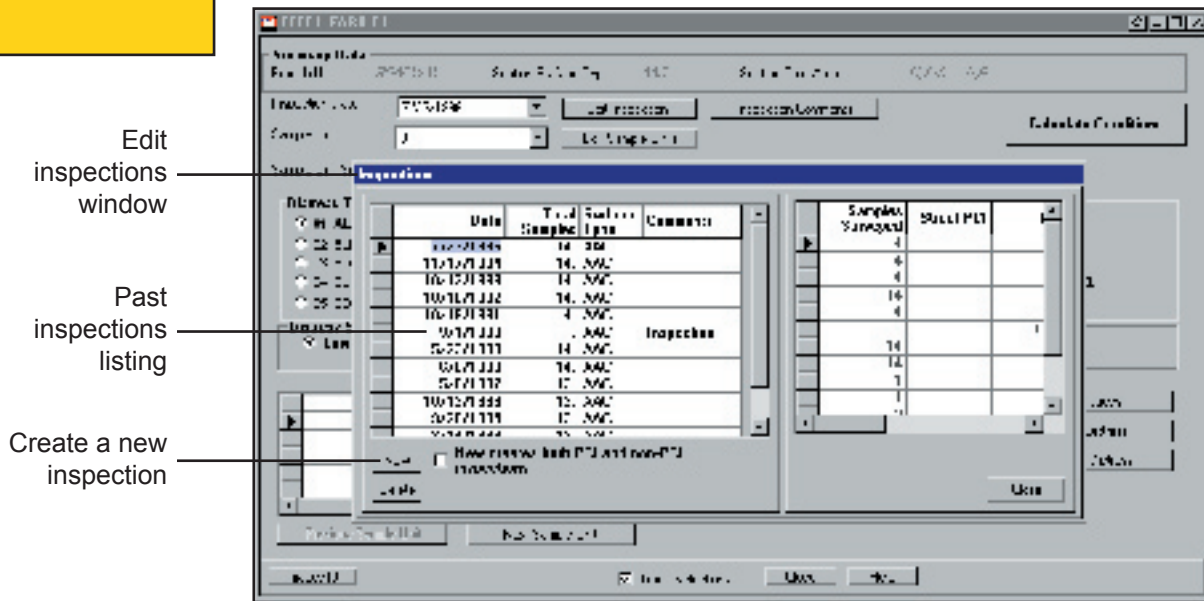
The screenshot displays two overlapping windows from the PAVER software. The top window, titled 'Select Inventory Item', contains several dropdown menus and checkboxes for selecting a specific network, branch, and section. The bottom window, titled 'Inspection', features a 'New Inspection' button, a date field, and a list of existing inspections. A table at the bottom of the 'Inspection' window shows a list of items with columns for 'Item Name', 'Status', 'Date', and 'Time'. The table contains the following data:

Item Name	Status	Date	Time
1. ALLOCATION	L	10/10/10	10:10
2. ALLOCATION	M	10/10/10	10:10
3. ALLOCATION	L	10/10/10	10:10
4. ALLOCATION	L	10/10/10	10:10
5. ALLOCATION	L	10/10/10	10:10

Note

Distress information entered into PAVER is associated with a specific date.

When you first create a new inspection date, the new inspection has the same sample information as the previous inspection. If the actual inspection date is different, click on the date and edit it. You may also edit the other fields in the window, including entering a comment for the inspection. When the inspection date and other fields are as desired, press the **Close** button to return to the **Inspection Data Entry** window; the most recent inspection will be the currently selected one.



Similarly, if you want to enter comments for an inspection date, click on the **Insp. Date – Comments** box and enter a comment (text string), which is stored with that inspection date. To check the comments on any given date, make the date current in the date window and click the **Insp. Date – Comments** box to view the contents.

PAVER uses sampling techniques for performing inspections. While you can inspect each section in its entirety, it is not practical to do so. It is acceptable to inspect only portions of a section. To use this technique, each section is divided into smaller pieces called sample units. Inspection information is collected from one or more sample units.

The PAVER **Inspection Data Entry** window matches the field inspection, and allows you to enter your survey information. Click the **Edit** button, next to the **Sample** window, to bring up the **Select Samples** window. The **Select Samples** window contains two lists. The left side shows the samples to be included in this inspection. The right side shows samples that were used in previous inspections. To use a sample defined in a previous inspection, click on the sample and then click the arrow button located between the two lists.

To add a completely new sample, click the **Add New** button. A sample is added to the end of the list with the **Sample Number** of “New” and a **Sample Size** of zero. Click on the **Sample Number** field and change the ID to the sample ID used in the actual field inspection. You may also enter a comment for the sample and switch the **Sample Type** between **R** (Random), and **A** (Additional).

If there is a sample definition in the left hand list that you do not wish to use, click on the sample you wish to remove, then click on the **Remove** button. If the sample already has inspection information (as can occur when editing the sample list for an existing inspection), PAVER informs you that the sample already contains information, and asks you to confirm that you really wish to delete the sample and any inspection information within the sample.

Entering Inspection Information

Note

You may enter duplicate distress type/severities. For example:

Alligator L 50
Alligator L 40

The PAVER **Inspection Data Entry** window is designed to be easy to use, while allowing experienced users to rapidly enter large amounts of inspection data. Once you learn the basic operations and become familiar with the window, it is possible to enter all the inspection information for an entire section using only the keyboard.

Once the section is selected and the inspection date and samples are set up, you are ready to enter the individual distresses. Click on the distress code and description, then click the desired distress **Severity** level, then click the **Quantity** field and type in the distress quantity. Note that the distress codes available in the list depend on the type of pavement you are inspecting, since some distresses are only found on a particular surface. Similarly, when you choose a distress code, PAVER modifies the available severity levels since some distresses cannot be assigned a severity level.

After you have entered the **Distress**, **Severity**, and **Quantity**, click the **Add** button to add the distress to the list. Similarly, if you want to delete an existing distress from the list, highlight a row by clicking on it and click the **Delete** button. The **Replace** button deletes the highlighted record and replaces that information with the current **Distress/Severity/Quantity** information. If you wish to enter a comment for the distress, click on the **Section Comments** button in the list of distresses.

Once you have entered inspection data for an entire sample, proceed to the next sample in the list by choosing another sample from the **Sample** drop-down box. You may also review previously entered data by using the **Sample** drop-down box.

The screenshot shows the PAVER Inspection Data Entry window. The window has a title bar 'PAVER - INSPECTION DATA ENTRY'. Below the title bar, there are several tabs: 'New Sample Data', 'Edit Sample Data', 'Section Comments', and 'Calculate Conditions'. The 'New Sample Data' tab is active. It contains a 'Section Name' field with 'PAVER' entered, a 'Section Number' field with '100', and a 'Section Description' field with 'PAVER'. There are also buttons for 'Add Section', 'Edit Section', 'Delete Section', and 'Calculate Conditions'. Below these fields, there is a 'Distress Type' section with a list of distress codes and descriptions. The list is organized into four columns. The first column contains codes like '01 ALLIGATOR CR', '02 CRACKING', '03 CURB CRACK', '04 CURB CRACK', '05 CURB CRACK', '06 CURB CRACK', '07 CURB CRACK', '08 CURB CRACK', '09 CURB CRACK', '10 CURB CRACK'. The second column contains codes like '11 CRACKING', '12 CRACKING', '13 CRACKING', '14 CRACKING', '15 CRACKING', '16 CRACKING', '17 CRACKING', '18 CRACKING', '19 CRACKING', '20 CRACKING'. The third column contains codes like '21 CRACKING', '22 CRACKING', '23 CRACKING', '24 CRACKING', '25 CRACKING', '26 CRACKING', '27 CRACKING', '28 CRACKING', '29 CRACKING', '30 CRACKING'. The fourth column contains codes like '31 CRACKING', '32 CRACKING', '33 CRACKING', '34 CRACKING', '35 CRACKING', '36 CRACKING', '37 CRACKING', '38 CRACKING', '39 CRACKING', '40 CRACKING'. Below the list, there is a 'Severity' section with a list of severity levels: 'Low', 'Med', 'Hgt'. There is also a 'Quantity' field with a value of '100'. At the bottom of the window, there is a table with columns: 'Distress Code', 'Distress Description', 'Severity', 'Quantity', 'Sample'. The table contains several rows of data. Annotations on the left side of the window point to various parts of the interface: 'Distress codes and descriptions' points to the list of distress codes, 'Severity level' points to the 'Severity' section, 'Quantity field' points to the 'Quantity' field, and 'Distress summary for a sample unit' points to the table at the bottom.

For Maximum Speed - Keyboard Only

The most repetitive part of inspection data entry is inputting the distress data. Once familiar with the PAVER **Inspection Data Entry** window, distress data entry can be performed totally on the keyboard.

To perform keyboard-only data entry, first set up the inspection and sample information as described in the previous section. All distress codes are two-digit numbers, and are shown to the left of the distress descriptions. To enter “Bleeding”, for example, type the two-digit code “02.” A rectangle appears around the code and description. You may change the distress selected by typing a different code, or by moving the selection rectangle with the arrow keys.

Select the proper **Severity** by typing “L” for **Low**, “M” for **Medium**, and “H” for **High**. Once you type a severity code, the cursor immediately moves to the **Quantity** field where you can type in the distress quantity. Note that the entire **Quantity** field is highlighted, meaning that anything in the box is immediately overwritten by what you type. If the distress has no severity level, then the **Low**, **Medium**, and **High** options are disabled (gray). To skip the severity, press the Tab key twice. The cursor skips first to the N/A option, then to the **Quantity** field.

Once you have typed in a quantity, add the distress to the list by typing “A” for **Add**, or by pressing the Enter key. PAVER creates a new row in the list of distresses and signals you with a short beep or click sound to let you know the data has been entered.

To enter a comment, you need to use the mouse to click on the **Comments** field in the list of distresses entered and type in the comment. When finished, click on the next distress code and resume keyboard-only entry.

When you are finished entering all the distresses for a sample, move to the next sample by typing “N” for **Next**, or move to a previous sample by typing “P” for **Previous**.

Batch Inspection Data Entry

In order to expedite inspection data entry, you may enter multiple inspection records at one time. For video inspection data, it must be in a specified format. There are two options for video inspection data imports. One option requires six ASCII text files. The other option requires at least one of five tables in a Microsoft Access database. For specific format requirements, see **Appendix B**. After data is in the correct format and all files or tables are complete, begin the batch entry by selecting the option from the PAVER **Add-Ins** menu.

Calculating the PCI after Inspection

Within the **Inspection Data Entry** window, PAVER allows the user to view the condition of an individual section immediately after distress data is entered. To access this feature, click the **Calculate Conditions** button in the **Inspection Data Entry** window. The section properties are all displayed at the top of the window. In the middle of the window, Condition **Index**, Inspection **Date**, and Condition **Value** are all displayed. This window also gives you basic information about the section that you are viewing. This is a description of the information available by tab:

- **All Indices** – This tab displays the **Condition Value** for all conditions associated with the current section.
- **Individual Distresses** – This tab displays distress information for every distress entry in every sample of the current inspection date. Added to the information is the density of that distress and the corresponding deduct value.
- **Extrapolated Distresses** – This table shows each distress type (all identical distress type and severity levels from the previous tab are grouped together here) with the quantities adjusted to reflect the extrapolated value. With random samples, PAVER extrapolates the distress quantity across the entire section.
- **Sample/Distress Summaries** – The left side of this tab displays the number of samples surveyed and compares the total number of samples to the recommended number for a project level inspection. The right side of this tab groups all recorded distressed by type and calculates the corresponding percentages.
- **Sample Info** – General data about each sample involved in the inspection is included here.

Again, right clicking any table provides **Print** and **Export** options. There is also a **Print** button at the bottom of the window.

Other Conditions

User-Editable Condition Indices

PAVER computes the value of the PCI (and all PCI related distresses defined in **System Tables/Condition Types/User Defined Distress Indices**). You may input all other condition index values in this table. The value can be accessed and utilized in other areas of the program, but the input is manual. Click on the field next to the condition index you would like to use (in the **Value** column) and type the data in directly. To add, remove, or edit the list of indices, click on the **Select Indices** button. This activates the same table viewed when **Condition Type Selection** is selected via **Visual Menu...System Tables...Condition Types** (see **System Tables** under **Condition Types**). The **Inspection Date Comment** button allows you to view the comments entered for this inspection date.

Copying Inspection Data

PAVER allows you to copy inspection data from one version of a database to another copy of the same database by using the **Inspection Data Import**. This can be useful when it is desired to copy the inspection information that was entered in one database to another similar database. To get started, click on **Inspection Data Import (PAVER Database)**. This is located on the **Visual Menu** under **Inspection**.

A Windows dialog box appears on the screen asking for the database file from which you wish to copy the inspection information. Once you have located the correct database file, a PAVER box appears and asks which inspection dates you wish to copy to the online PAVER database. Select the appropriate dates from the list, click OK, and the inspection data is imported.

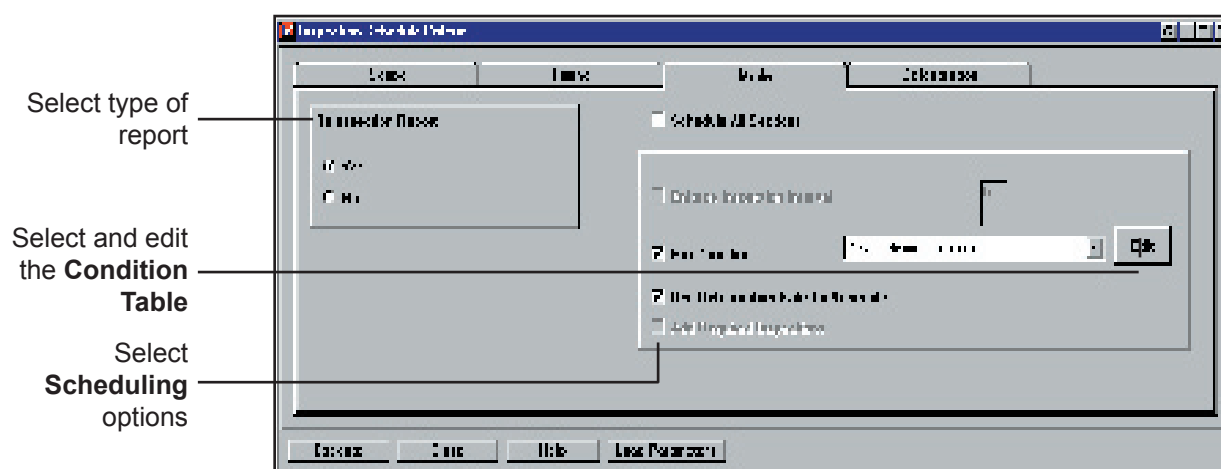
Inspection Schedule

Inspection Schedule Report

The **Inspection Schedule** report selects sections for inspection subject to minimum condition criteria or projected deterioration rates. The **Inspection Schedule** report operates like the **Condition Analysis** report and the **M&R Work Plan** report. When the report is opened, you may configure the parameters to be used with the report and then execute the report. The completed report is presented in the **Report Viewer**.

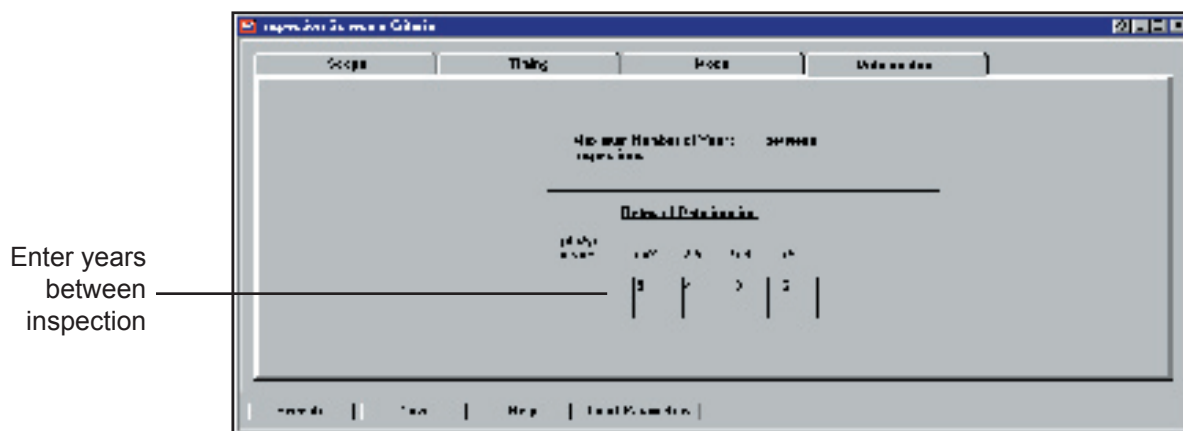
Start the **Inspection Schedule** report from the **Visual Menu** by selecting **Inspection Schedule** and then **Inspection Schedule Report** from the sub-menu. Select the sections to include in the report with the **EMS Query Tool** on the **Scope** tab. **All** can be selected to include all the sections in the active database, or select **Selected Items - Edit Selection** and use the **EMS Query Tool** to build a subset of sections. The **Timing** tab is used to specify the scheduling period.

The **Mode** tab is used to configure the method for selecting pavement sections to inspect. Select the **Schedule All Sections** to specify a complete inspection. Use the check boxes to enable or disable the **Min Condition** and **Use Deterioration Rate To Schedule** options. These options may be run together or separately. A third element for the report is to generate a **Re-Inspection Report**. The **Re-inspection Report** option is turned on or off by using the **Yes/No** selector buttons, selecting “Yes” generates a re-inspection report along with the inspection schedule (A description of the **Re-inspection Report** is included in the **Reports** section).



You may choose to schedule inspections according to a table of minimum acceptable conditions, if desired. If the **Min Condition** box is checked, projected section conditions are compared to a list of minimum conditions, and a section is only scheduled for inspection if that section's condition falls below the matching record in the minimum condition table. When the **Min Condition** alternative is selected, you may specify a minimum condition table. Use the drop-down box immediately to the right of the **Min Condition** check box to select a table of acceptable minimum conditions. The **Edit** button can be used to review the selected minimum condition table. If the table is viewed, a list appears separated by **Branch Use**, **Section Rank**, and **Year**. For each row, there is an associated minimum condition. The table of minimum conditions can be viewed and edited from here.

If the **Use Deterioration Rate To Schedule** box is checked, the table on the **Deterioration** tab allows you to configure the relationship between deterioration and inspection frequency. PAVER checks the rate of deterioration for a section included in the report and categorizes it based on the numbers placed in each rates of deterioration category.



Run the **Inspection Schedule Report** by clicking the **Execute** button. The **Inspection Schedule Report** is presented in the **Report Viewer** with the default view as a summary of inspections per year. To obtain a version of the report that lists the individual sections inspected for each year of the report period, click on **Go to Detail**. When closing the report, PAVER will ask you if you want to save it. If you respond “Yes”, it creates a file name of your choice (with an “RPI” extension).

Open Saved Report

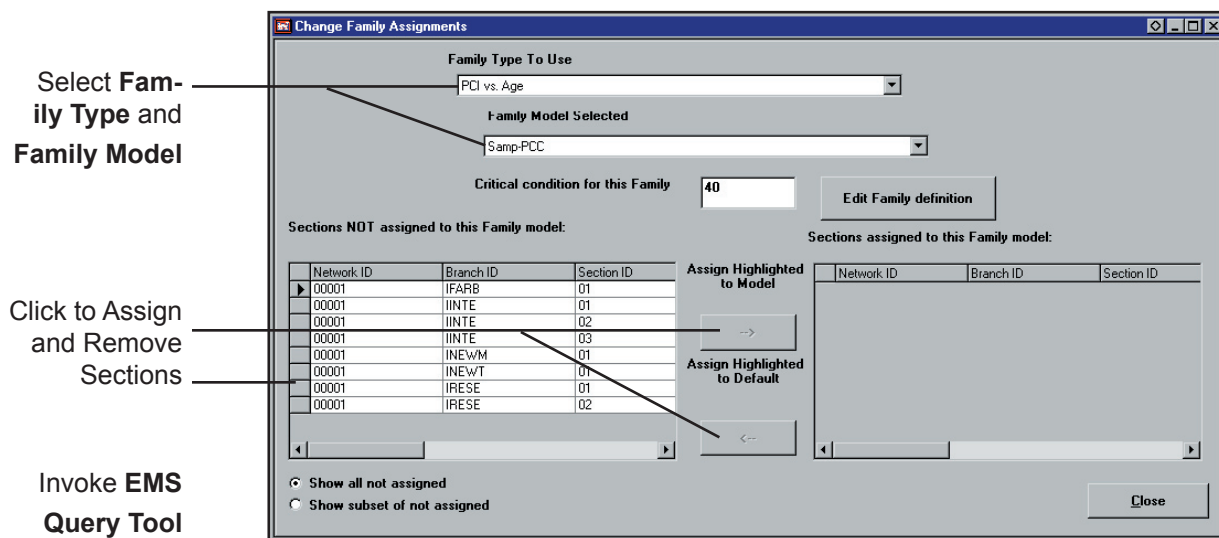
This is the utility that allows you to open an RPI file – a saved inspection schedule. Simply search to the directory where you saved the RPI, double click the file name, and it opens in the same view as when you originally created it.

Family Assignment

Change Family Assignments

Family assignments can be made when a section is defined in the Inventory module, or when a family model is created in the Prediction Model portion of the program. However, if you want to change a family assignment or rapidly assign families to sections, the **Change Family Assignments** routine provides an efficient routine for reviewing or adjusting family assignments. Some definitions for clarification include the following:

- **Family:** A group of pavement sections with similar deterioration characteristics.
- **Family Model:** The plot of observed age and condition measurements for pavements with similar attributes.
- **Family Type:** A pairing of a condition type and an event (such as age), for the purpose of plotting data points.
- **Family Assignment:** The process of assigning a **Family Model** to a section for use by the condition prediction engine.



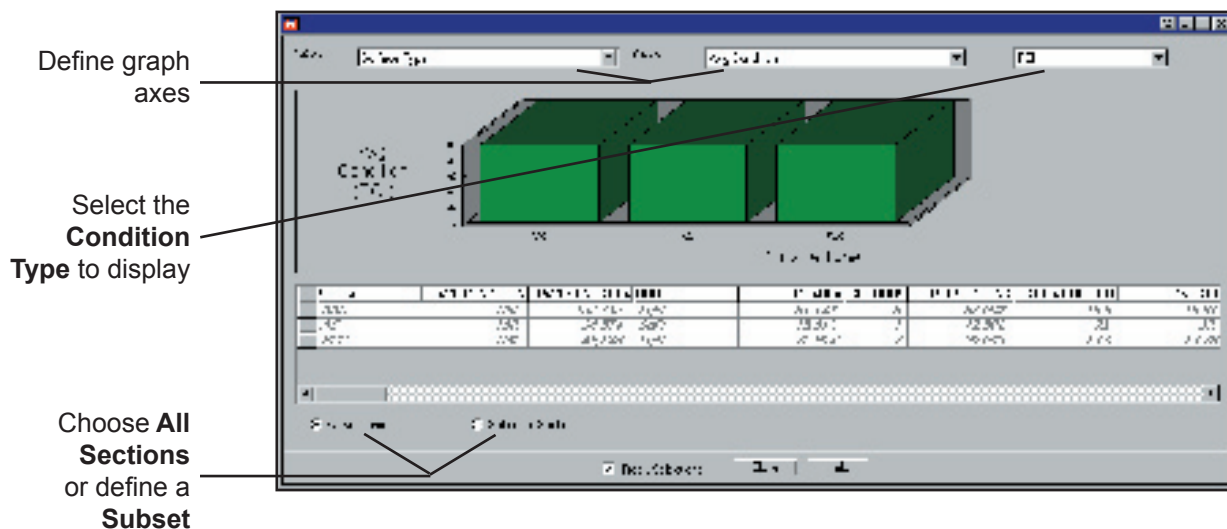
Change Family Assignments is accessed through the **Prediction Model** selection on the **Visual Menu**. After selecting a particular **Family Type** and **Family Model** from the drop down lists, PAVER displays all sections in the active database grouped into two categories: sections assigned to the current model and sections not assigned to the current model. The **Family Type** listings available in this menu are internal to PAVER and cannot be changed. The **Family Model** options, however, come from the **Prediction Model** and are user created. PAVER comes with a set of sample models.

To assign or unassign a section, highlight a section (or group of sections) and use the arrow buttons to move the section(s) into the appropriate category. You can view a subset of sections at one time by using the **Show subset of not assigned** radio button. Clicking on this button invokes the **EMS Query Tool**. From this point, you can design a query (i.e. Surface Type = PCC) and use that to assign all sections in the query to the current **Family Model**. To edit the subset, click on the **Define Subset** button to invoke the EMS Query tool.

Reports

Summary Charts

Summary Charts is a feature designed to allow you to graph, and compare any two attributes of a database. For example, you can view the average condition of your network based on surface type. To access the **Inventory Summary Charts**, select the **Visual Menu** button from the **PAVER Button Bar** and choose **Reports** and then **Summary Charts**. At this point, the **Summary Charts** window appears and awaits your selection of a category to represent the X and Y axis. Using the drop-down boxes labeled **X Axis** and **Y Axis**, select an **X Axis** for the graph you wish to produce. The drop-down box for **Y Axis** selections is hidden until you make your selection for the X axis. The third drop-down box requests that you make a selection of which condition index you wish to use. Remember, for the charts to work properly, you must have condition data available for the index you have selected. PAVER automatically associates a PCI with every section in your database. Every other index requires that you either input the value manually or establish a definition for the index (discussed in detail under **User-Defined Indices**).



After you have made valid selections (some combinations may produce a null set of sections and hence no graph), the graph and data table below populate. For the table at the bottom of the page, dragging the border with the mouse can modify the field widths. A right mouse click on the table Produces the **Print**, **Export**, and other options for the table.

Standard Reports

There are four **Standard Reports**: **Branch Listing**, **Work History**, **Branch Condition**, and **Section Condition Reports**. These reports are accessed through the **Visual Menu** via the **Reports** option.

A brief description of each of the four **Standard Reports** is as follows:

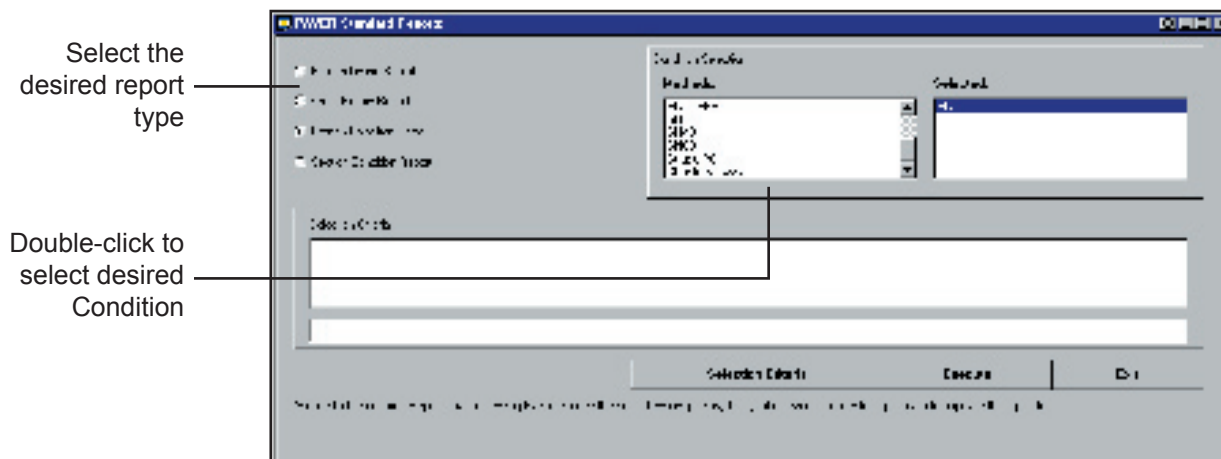
- **Branch Listing Report** – This report produces a list of all branches and relevant information on each including usage, number of sections, total area, etc. The last page is a summary of all branches in the network (or networks).
- **Work History Report** – This produces a section by section report of all work completed within that section over the life of the database. Data such as work type, work date, and cost are included.
- **Branch Condition Report** – This is a display of the average and weighted average condition of each branch. Standard deviations are included, and a summary of all branches is included on the last page.
- **Section Condition Report** – This is the same as the branch condition report only the data is displayed at the section level. Again, a summary is included on the last page.

Note

For **Standard Reports** there is no **Order Rows** tab in the **EMS Query Tool** since reports are created in a standard layout.

The starting point for each of these reports is the same. Define the subset of the database you wish to run the report on by clicking on the **Selection Criteria** button. The subset can range from one section to the entire database which is the default if you do not establish **Selection Criteria**. Clicking on the **Selection Criteria** button opens the **EMS Query Tool**. Use of the **EMS Query Tool** has been discussed in previous sections.

When running the **Branch** and **Section Condition Reports**, one additional piece of information is required. Before the report can be executed, you must select which condition index is to be used. This is done by double-clicking on the desired condition in the **Condition Selection** box under **Methods**. This places that condition type in the **Selected** window, at which point you can proceed with the query or execution of the report. To deselect an item in the **Selected** box, double-click on it to send it back to the **Methods** box. Only one condition index can be used per report.

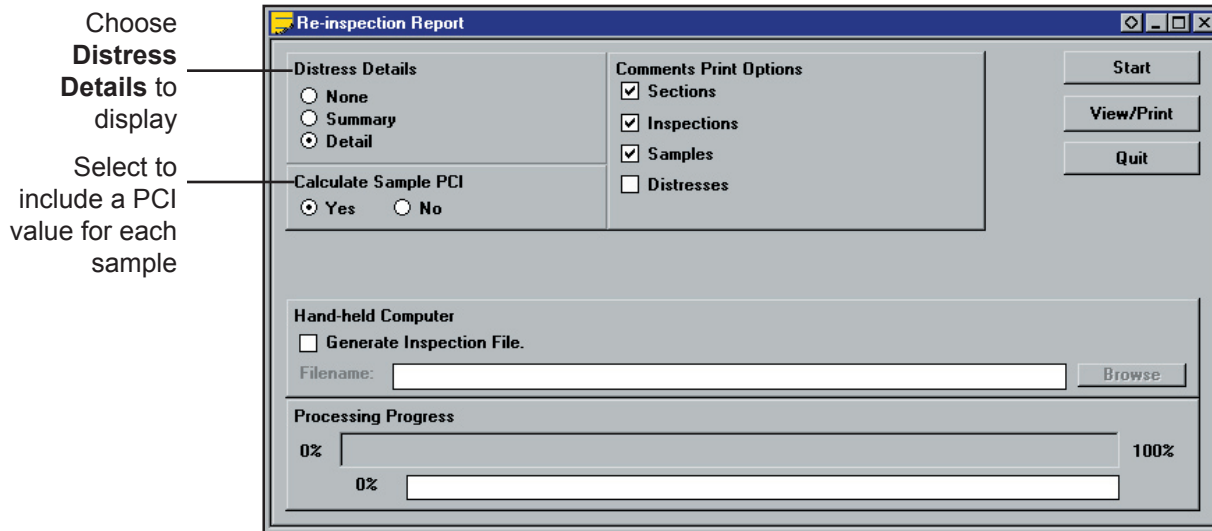


On the top of each of the reports is a tool bar, used to manipulate the report. Left and right arrow buttons are used to go forward and backward through the report. In between the arrows is a display of the current page and the total number of pages in the report. There is a print button and an export button to send the report to a printer or to a file for further manipulation. Finally, a **View Size** drop-down box allows you to size the report for ease of viewing.

Re-Inspection Report

The **Re-Inspection report** is designed to produce a listing of information about the last inspection for each section included in the report. The **Re-Inspection** window offers several options for configuring the report:

- **Distress Details** – This section gives you the option to display recorded distress information from the last inspection in three levels of detail (Remember: distresses are entered at the sample level and are associated with a specific inspection date.):
 - **None** – No distress details shown.
 - **Summary** – Distress code and severity level of each distress in the sample unit are shown.
 - **Detail** – Complete details for every distress listed in the current sample are shown.
- **Calculate Sample PCI** – This produces a PCI for each sample listed. Although Paver works with Section level PCI's throughout the program, this shows the PCI of each inspected sample.
- **Report Sample Ordering** – This gives you control over how the re-inspection report sorts and orders the samples in each section – numerically or alphanumerically. Your choice is based on how you have chosen to name your samples.
- **Comments Print Options** – Checking any combination of these boxes enables the report to display comments that were entered at that level. Within the program, you can enter comments in a text field, at any of those levels – here is where those comments can be printed out.
- **Hand-Held Computer** – Selecting this option creates a file (extension INP) that can be downloaded to a handheld device for use during the inspection process. This file provides the handheld unit with all information necessary to perform an inspection on a section. To use this feature, select the **Generate Inspection File** box and type the path and name of the file you wish to create (using the INP extension). You can also click on **Browse** and point to the folder you will be storing the inspection file in. You still need to name the file – making sure to add the .INP extension in the name, and click **Open** to place the path and file name in the **File name** box. From here, you will run the re-inspection report as usual and Paver creates the INP file and places it in the path you specified, when the re-inspection report is finished.



Now that you have configured your report, clicking the **Start** button creates the report. The next thing you see is the **EMS Query Tool**. At this point, you can select the whole database, or specific sections to be included into the report. When you say **OK** to the **Query Tool** (Saying **OK** to an empty query selects the entire database) the re-inspection report executes. When the progress bar indicates that the report is complete, clicking on **View/Print** displays the report. From this screen, you can view the contents, print the report, or export to a file or application. If you want to change any of the report parameters, simply close the view window, make the appropriate changes on the configuration screen, and select the **Restart** button.

User-Defined Report

The user-defined reporting tool gives you the ability to create your own report. The results of the report are displayed in table form that can then be printed or exported to another application (such as Microsoft Excel). As with other tables in PAVER, right click on the table to access the print and export options menu.

Opening the user-defined reporting tool produces the **EMS User-Defined Reporting Tool** window that offers three options: display a **Memorized Report**, **Create New Report**, and **Edit Current Report**.

Display a Memorized Report

This is a report that you have created and saved. It is available from the pick list at the top of the window. This report regenerates each time you select it, so all information displayed is current.

Create New Report

Click on the **Create New Report** button and the **EMS User-Defined Reporting Tool Definition** window appears. On the left side of the definition window, there is a tree that reflects your database structure. On the right side, there is a window with three tabs. Use the tree in the left side of the window to select a component of the hierarchy that contains the data elements that you would like displayed in your report. All associated elements are displayed in the left window of the **Select Columns** tab. You can scroll through the various levels of the tree in the left side of the window to see exactly which elements are associated with the different levels of the inventory structure.

Note

Selected Rows determines which records will be included in the table, while **Selected Columns** determines what data from each record is displayed.

In the right side, the first tab, **Select Columns**, requires you to specify the data items that are displayed in each column. Select individual components and move them to the window on the right side. All elements in this window become the column headers for your report. Only the elements you select from the center window and move to the right side are integrated into the report.

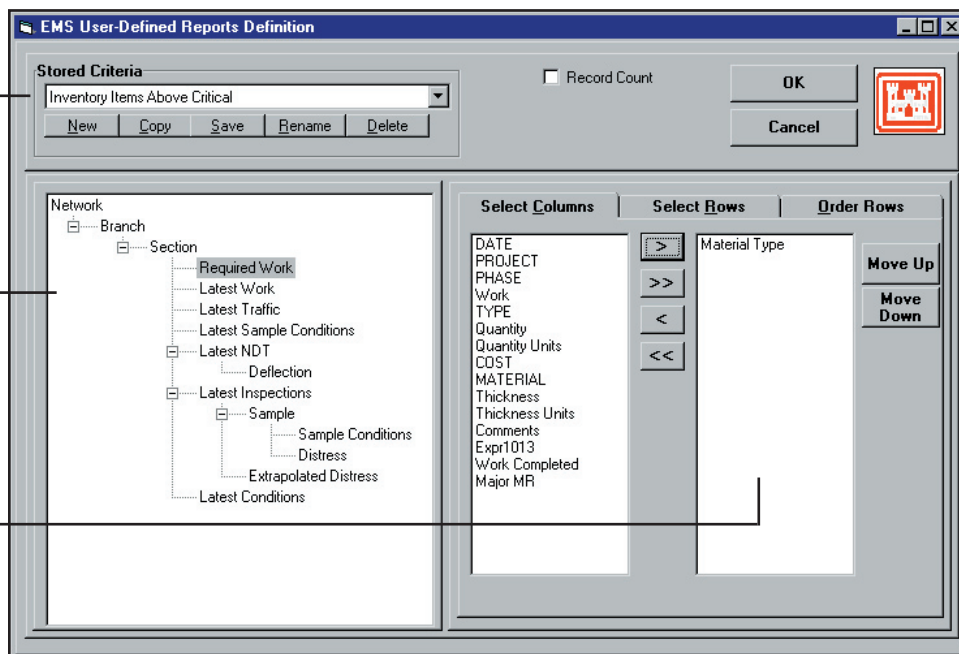
Select Rows invokes the **EMS Query Tool** and allows you to build the selection as you would in any other case that the **Query Tool** is used. Finally, the **Order Rows** tab allows you to order or sort the records in the table.

In between the two windows of the **Selected Columns** tab and the **Order Rows** tab, there are two types of arrows. Double arrows move all items in the window, and single arrows only move the selected item. If you choose to deselect an item, simply move it back to the center box, and it is removed from the list. The **Move Up** and **Move Down** buttons allow you to position the selected components in the desired order. The **Change Order** button, in the **Order Rows** tab, changes between Ascending and Descending orders for the selected components.

Store criteria to be used again as a **Memorized Report** format

Navigate through inventory components for data

Columns to be included in the report must be shown here



The **New**, **Copy**, **Save**, **Edit**, and **Delete** buttons, located in the top left of the window, become available to perform the corresponding actions as the circumstances allow. Previously saved formats are listed in the **Stored Criteria** drop down list.

Edit Current Report

The first step to editing a report is to select the desired report from the drop-down box at the top of the **Edit** window. From here, all of the same options from **Create New Report** are available. When the editing is complete, the changes take effect immediately and are reflected the next time the report is run.

To **Run** a report, simply select the report from the drop list at the **EMS User-Defined Reporting Tool** window, and the populated table appears. The report generates at the moment of selection so all data is current.

GIS Reports

The **GIS Reports** are a series of preset views that allow you to see a variety of information about your database in a graphical display. They are only available if you have a map linked to your database (see the GIS section for details on linking). The views are grouped into 2 sections: **Last PCI** and **General Info**.

To navigate these views, use the **GIS Viewer Buttons**. They function in the following manner:

- **Center** – Centers the current view at full extent
- **Pan** – Allows you to move around the view at the current zoom level
- **Select** – Activates the selector tool so you can use the GIS view as an inventory selector (See the section on “Selectors”)
- **Zoom Area** – Allows you to block portion of the view to zoom in on
- **Zoom In** – Zooms in one level on the entire view
- **Zoom Out** – Zooms out one level on the entire view
- **Print** – Prints a copy of the view and the categories with color codes

Last PCI

This view displays the current/latest PCI value for each section in the view. This PCI value comes from the last inspection date (or last major M&R activity date). Going to **Tables** from the menu bar, and selecting **Condition Tools** and **Define Condition and Age Categories** can define the categories and values, as well as associated graph colors. In this table, on the **Condition Categories** tab, select **PCI** in the **Name** drop-down box, and you can make new categories, change names, assign numeric ranges, and manipulate color schemes.

General Info

Unlike the **Last PCI** view, **General Info** actually consists of four separate views:

- **Surface Type**
- **Category**
- **Rank**
- **Branch Use**

The categories and associated color schemes in these views are preset and cannot be changed. Since the **General Info** window has four views, only the *top, checked* view will be displayed. Each view name has a check box next to it. If only one box is checked, then only that view displays. If more than one view is checked, the view that is highest in location on the list displays. The up and down arrows under the views box can be used to move views up or down on the list. Highlight a view and use the arrows to move it to a different location on the list.

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Prediction Model

Create and Maintain Prediction Models

Building Family Models

The essence of the prediction modeling (family modeling) process is to identify and group pavements of similar construction that are subjected to similar traffic patterns, weather, and other factors that affect pavement life. The historical data on pavement condition can be used to build a model that can accurately predict the future performance of a group of pavements that possess similar attributes. This model of pavement life is assigned a name, and in the PAVER vocabulary it is referred to as a “family.”

Each pavement section in PAVER is assigned a family. When predictions about the future performance of a pavement are desired, a section’s family assignment is used to predict a section’s future condition. If the user has not assigned a family model to a section, PAVER will use its default family to predict future pavement performance.

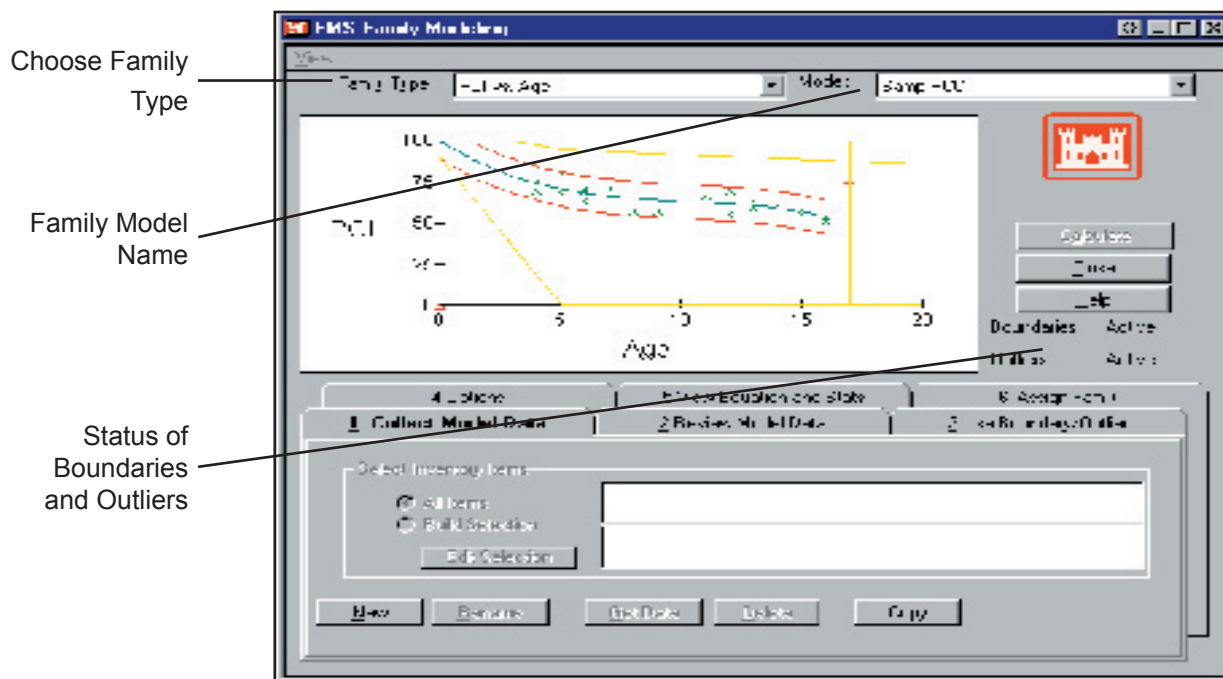
However, factors such as original construction, maintenance, weather, and traffic, greatly affect the life of a pavement and a generic guess, one of which is the default family, is not likely to be as accurate as a model that takes these factors into consideration. The **Prediction Model** is designed to allow users to blend unique knowledge about their pavements, measured local condition information, and powerful modeling tools together to produce highly accurate estimates of future pavement life.

Note

When selecting a model, scroll and type seek capabilities are available if the number of saved models exceeds the length of the list.

Using the Prediction Model

Click on the **Pred. Modeling** button on the PAVER button bar. The **Prediction Model** can also be reached via the **Visual Menu**. A window titled “EMS Family Modeling” appears. The top half of the form is a graph that shows a sample start-up prediction model. Two drop-down boxes are located above the prediction model graph. By clicking the arrow on the right side of these boxes, you can select a **Family Type** and a saved prediction model. Select a model from the list. When you select a model, PAVER loads all the data points used to build the model and the settings used to generate the model. It then plots the data points and the estimated condition prediction function.



The upper right corner of the **EMS Family Modeling** form contains three buttons: **Calculate**, **Close**, and **Help**. The **Calculate** button causes the model to estimate the condition prediction function and plot the curve through the data points. The **Close** button closes the **EMS Family Modeling** window. Any models you have built are automatically saved when the **Close** button is clicked. “Help” is launched by clicking the **Help** button. The prediction model plot operates like other PAVER graphs. A right click on the graph displays the extended graphing features menu.

Located just below the **Help** button are the **Boundary** and **Outliers** status indicators. Once a model is selected or created, the **Boundary** and **Outliers** status indicators are activated. These indicators report the status of the boundary data filter located on card **3. Use Boundary/Outlier**, and the statistical outlier analysis feature that is configured on card **4. Options**. These options, and all other family model building variables, are configured on the index card style data entry forms located on the lower half of the **EMS Family Modeling** form.

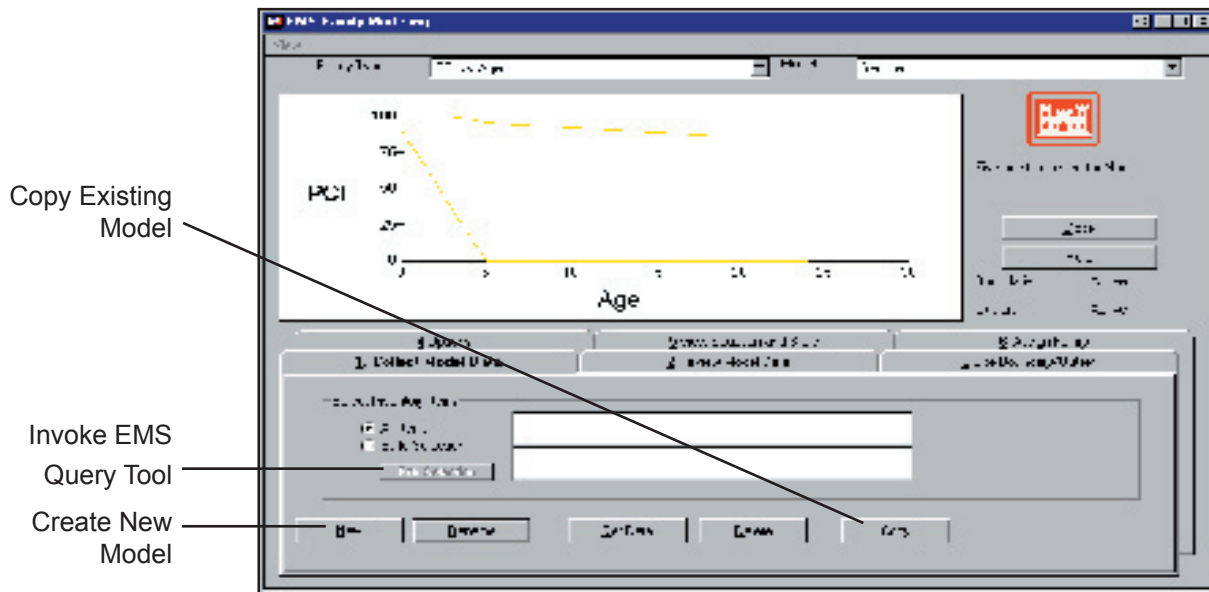
Collect Model Data

Note

When a prediction model is created, only data points that are at least one year old are used.

This form is used to collect data from the active PAVER database and in order to build a new family model or to adjust an existing family model. To create a new model, click the **New** button. You are prompted to provide a name for the new family model being created (entries may be up to 16 characters in length). After naming your family model and clicking **OK** on the **Create New Model** form, the **EMS Query Tool** is presented so that you may select a subset if desired of the active database. After selecting the filter criteria (which can be none), the age verses condition points for the pavement sections selected are placed in the grid on the **Review Model Data** card as well as displayed on the graph.

The **Get Data** button at the bottom of the **Collect Model Data** card is used to modify the data used in an existing family model. After you click the **Get Data** button, you are prompted to overwrite the existing model data, append to (add to) the existing data, or abort the get data operation. The **Copy** button creates a new model based on the family model that was active when the **Copy** button was clicked. You are prompted to provide a name for the new model. Clicking the **Delete** button causes the active model to be deleted.



Note

Points can be added to the **Review Model Data** table in order to influence the model curve. When entering data you need only enter Age and PCI values.

Review Model Data

This card presents data used to create the family model. Like other tables in PAVER, the extended features can be accessed by right-clicking on the table. The **Status** column contains no entry for records that are used to calculate the condition prediction curve. Points that are removed from the prediction process by boundary conditions or outlier analysis are labeled as “Out of Range” or “Outlier” points. You can add points to this table if you wish to influence the curve in a particular area. If any records are added or deleted, you must recalculate to refresh the graph.

Use Boundary/Outlier

Upper and lower model boundaries are specified on the **Use Boundary/Outlier** card. Age vs. PCI points that fall outside the boundaries are marked as “Out of Range” in the **Review Model Data** table and are not considered when the predicted condition function is estimated. Points marked as “Out of Range” can be reintroduced into the analysis by turning off the boundaries or shifting the location of the boundaries so those points are in the allowable range. The **X Range Filter** is used to specify a range on the x-axis from which you want to include data. Data points outside the range you specify are ignored.

Model boundaries are adjusted by changing the values in the table on the **Use Boundary/Outlier** card. To edit or change a value, highlight the row in the table you want to change. Then, select the column you wish to edit (year, lower or upper bound) and type the new value (numeric entries only).

Note

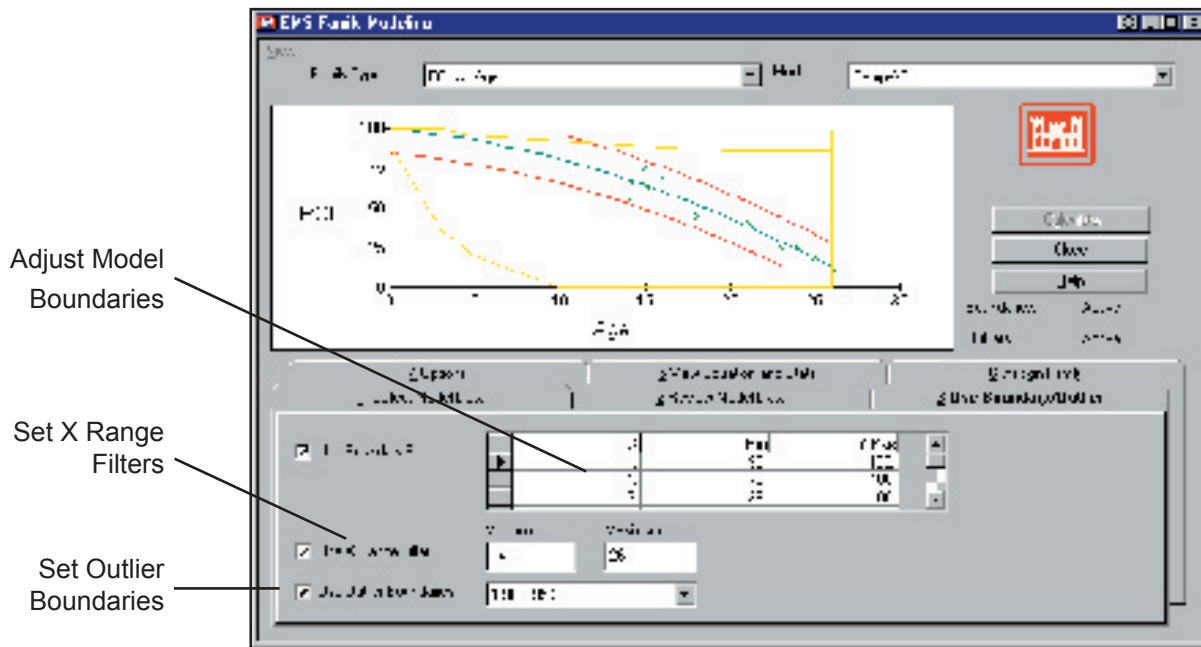
In order to edit **Use Boundary/Outlier** or **Collect Model Data** tabs, make sure the check box next **Prevent Changes to Model** in the **Options** tab is unchecked.

Note

To add or delete rows of boundary data, right click on the table.

New rows can also be added to the table with the right click menu. The **Add** option inserts a blank row in the last row of the boundary data table. Records in the boundary data table are sorted in ascending order by age (year). Edited and new records are out of order until the model is recalculated. You can force a recalculation of the model by activating any of the other index cards and then clicking the **Calculate** button. After the model is recalculated, the boundary table entries will be in proper sort order.

You can also set **X Range Filters** - minimum and maximum. Finally, the outlier boundaries are used to limit the number of data points used in the computation of the curve. Options for outlier constraints range from 50 to 100 percent. Changing these various options and recalculating produces different curve results. Use tab **5. View Equation and Stats** to determine the statistical soundness of your curve.



Options

The **Options** card is the heart of the statistical analysis performed in the prediction modeling tool. In the “Slope” section, you can choose to constrain the curve upward or downward, or leave it unconstrained. You also set the critical PCI for all sections assigned to this model by entering the value you wish in the “Critical Condition” window. To prevent changes to the model select the check box associated with the label **Prevent Changes to the Model**.

View Equation and Stats

The **View Equations and Stats** card displays the intercept and coefficient values for the equation estimated to be the best fit for the data. The card also lists various “goodness-of-fit” statistics for the estimated model.

Assign Family

Once a new family model has been completed, the **Assign Family** card can be used to assign the active family model to the pavement sections that were used to create the model. When you select the **Assign Family** card, the program checks the contents of **Review Model Data** card to build a list of the sections used to estimate the current family model. When you select the **Assign Family** card, the program first checks whether any sections in the current database are assigned to the selected **Family Model**. If the **Family Model** is not assigned to any sections, a message comes up indicating both that there are currently no sections assigned this model and asking whether you would like to assign the sections used to build the model (i.e. sections that fit the selection criteria on the **Collect Model Data** card). You may choose to assign these sections to the current family or continue without assigning the family to the sections.

Once the **Assign Family** card is active, the card contains a table and two buttons. The table lists the pavement sections in your database that are assigned the current family model. The two buttons arrayed on the card below the **Assign Family** table, **Add Members to Family** and **Remove Current Members**, are used to edit the pavement sections assigned to the current family model. To drop a section from the current family, highlight the section in family assignment table and click **Remove Current Member**. The section that is dropped is assigned the default family. The **Add Members to Family** button launches the same process as the **Edit Selection** routine on the **Collect Model Data** card. When you click the **Add Members to Family** button, the **EMS Query Tool** appears. You can use the **EMS Query Tool** to identify the sections you would like to assign the active family model to. When you have completed the query, the selected sections are added to the **Assign Family** table.

Other Condition Prediction Model Features

When the **Prediction Model** is open, a **View** menu appears at the top of the window. This option allows you to turn on and off various graphing features including **Boundaries**, **Outliers**, **Good Points**, and **Bad Points**. These features only affect the view of the data, not the underlying statistical routines. For example, if you use the view menu to turn off the boundaries, the boundaries do not appear on the plot of the graph. However, points in the model that do not meet the boundary conditions are still excluded from the modeling process.

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Condition Analysis

Condition Analysis Report

Overview

The Condition Analysis feature allows you to view the condition of your pavement network, or any subset of the network you specify. The analysis is based on prior inspection data, interpolated values between previous inspections, and projected conditions based on family assignment. Once you specify the pavements that you would like to analyze and duration of time to be used, PAVER can predict the deterioration of your pavements. The Condition Analysis tool is invoked by clicking on the Condition Analysis button on the button bar or by going to the Visual Menu and selecting Condition Analysis, then selecting Condition Analysis Report from the sub-menu, and clicking on the Continue button. The Condition Analysis parameter collection window appears on the screen.

Configuring the Condition Analysis Report

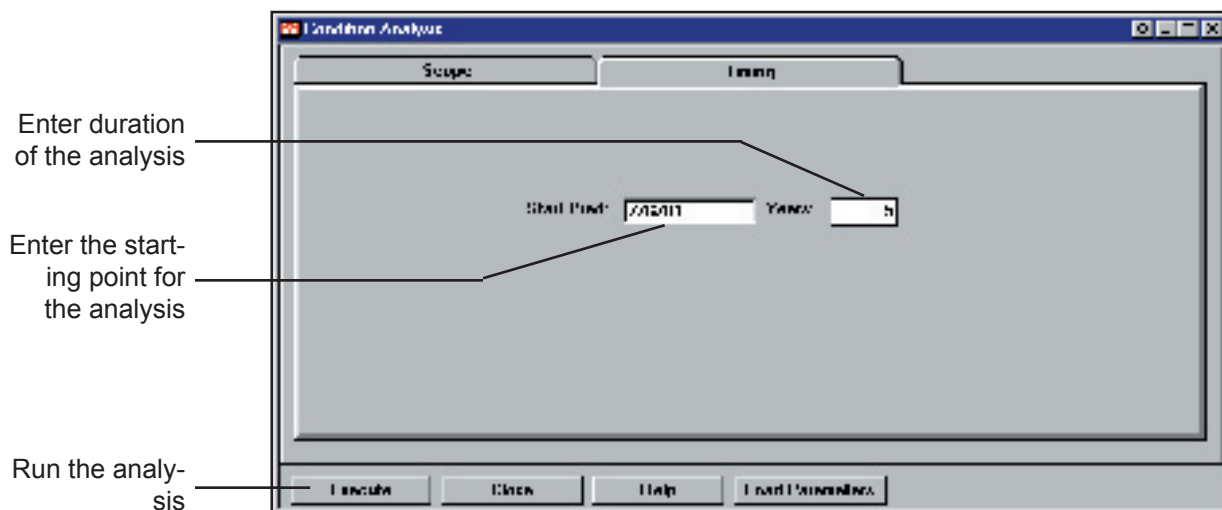
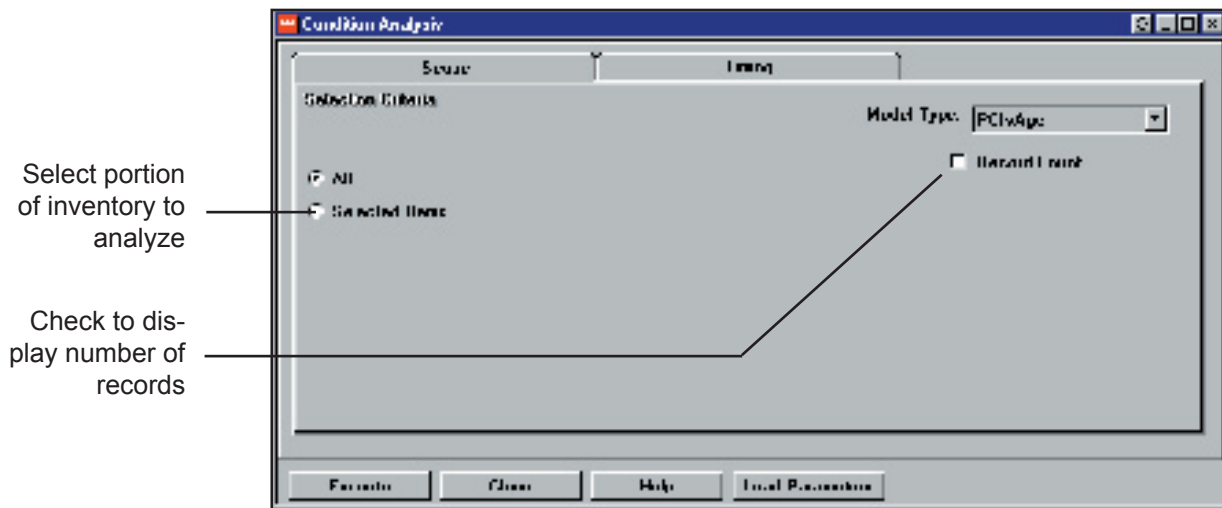
Note

You can select a **Start Date** to show past condition.

When the Condition Analysis is selected, a window with two file cards appears. On the Scope card, the Family Type choices are PCI v Age or IRI v Age. At the left, two options are available for selecting inventory items to be reported: All and Selected Items. The default is set to All. Choose Selected Items to prompt the EMS Query Tool to select a subset or records for the report. After selections are made, the selection criteria is shown in the previously empty white box. The Record Count box shows the number of sections included in the current plan.

Behind the Scope card is the Timing card. Enter the desired date to start the prediction model in the box next to Start Pred:. Then, enter the number of Years to report. The report includes historical information and predicted condition for selected sections for each year for the selected number of years.

You can use previously saved report parameters using the Load Parameters button at the bottom of screen. A dialog box asks from where to load the report. Condition Analysis report files typically carry the extension “RPC.” After loading the report parameters, you may change them as needed, then run the report.



Analyzing Pavements

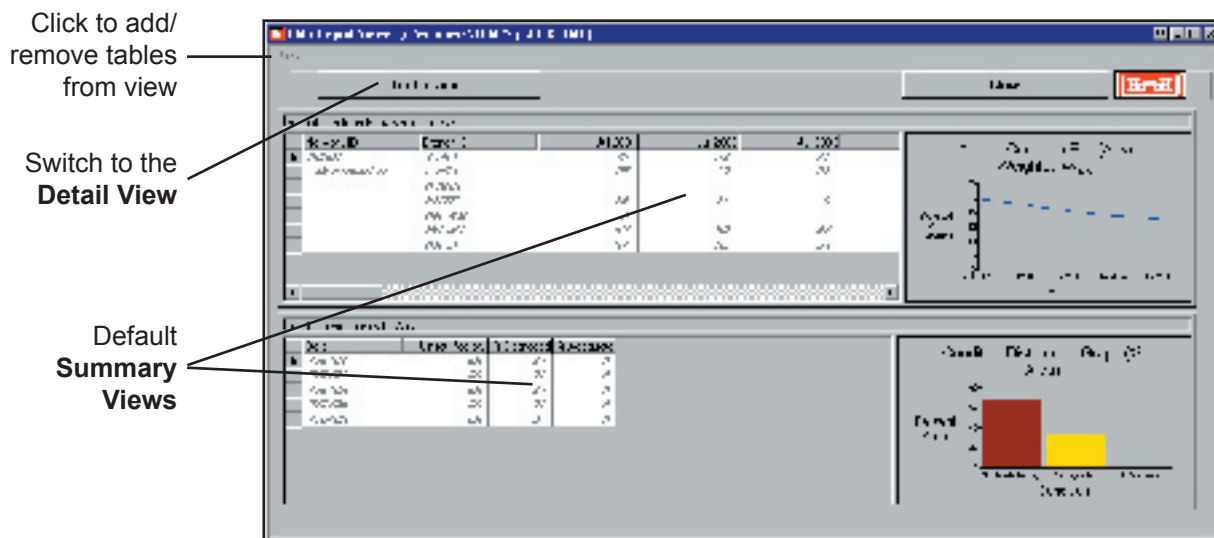
Once you have configured the report, click the Execute button to start calculating the report. When the report calculations are completed, the Condition Analysis Report is presented in the Report Viewer tool. The default presentation of the report is a summary of conditions that includes two tables with corresponding graphs. The summary view includes the Annual Condition (Arithmetic Average) table that shows the average condition for each branch, for each year in the reporting period. The first row of the condition summary table is the average condition of all branches included in the report. The condition summary table is accompanied by a graph that plots the average condition for the highlighted branch (row) in the condition summary table.

The second view is the Condition Frequency (% Area) table and associated graph. The condition distribution table presents a histogram for each year of the specified reporting period with sections grouped into seven PCI categories (excellent, very good, good, fair, poor, very poor, and failed). The condition

distribution graph presents a histogram for the highlighted year in the condition distribution table.

The View menu in the EMS Report Viewer can be used to add or remove tables and associated graphs from the report viewer screen or to switch between the summary and detail version of the report. To turn off one of the summary tables and its associated graph, select View > Summary and then select the table that you want to turn off. Tables and graphs that are active in the current report view have a check mark to the left of the table or graph name.

As usual, in order to zoom on a table or graph, right click on the desired object and select zoom. Other options can be selected with a right click such as: Revise Layout, Change Sort Order, Export and Print Table.



Other Views

The detail version of the Condition Analysis report default presentation includes the Section Condition table and its associated graph as well as the Inventory Items table. The Section Condition table is linked (as the dependent table) to the Inventory Items table (parent table).

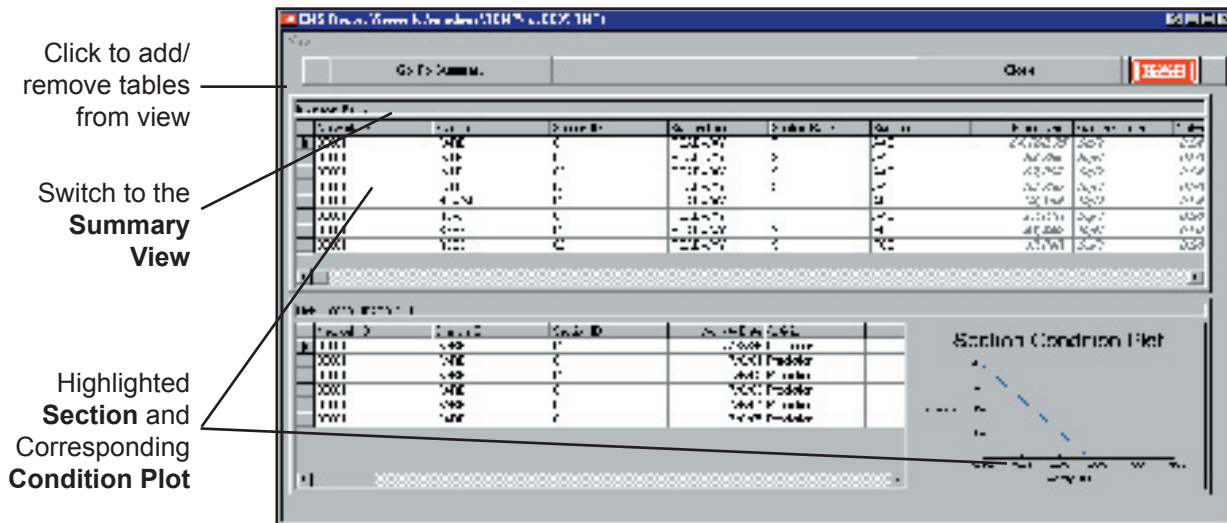
Note

Data shown in the **Summary View** is branch level data while data shown in the **Detail View** is section level data.

A powerful feature of the Condition Analysis Report is demonstrated by selecting the Inventory Items table and then stepping down the Inventory Items table slowly one row at a time. Each row in the Inventory Items table represents one section in your pavement network. As you change the highlighted row in the Inventory Items table, the Section Condition table updates with historical, interpolated historical, and projected condition values for that section. Each time the Section Condition table is updated, the graph associated with the table replots the graphical view of the section condition. With this powerful tool you can quickly analyze the history and predicted condition of your network section by section.

The detail version also allows you to overlay the Section Condition plot with family curve and/or the Work History plot. These features are turned on and off with under View > Detail in the EMS Report Viewer window. Overlay-

ing a family curve shows how the current view is performing in comparison to a particular family model. Overlaying a work plan shows the difference between the predicted decline of a pavement (or set of pavements), and the effects your work plan scenario. The Section Work History view (also linked to Inventory Items) produces a list of all information in the work history table - by section. Similarly, the Inventory Work History view displays ALL work history records for every item in the current database. The Section Condition List is a representation of the condition plot - for each section - for the term of the condition analysis. Highlighting a record in the table causes the graph to respond, displaying the condition information for that section only. To see an average for all sections included in the report, go back to the summary views.



In addition to the EMS Report Viewer, the Condition Analysis Report also opens a “Select GIS Views” window. This window contains a preset view linked to the results of the current Condition Analysis report. The name of the view is “Section Conditions by Year” and can be viewed by double clicking on the GIS tree selector in this window. The resulting display is a year-by-year view of the conditions of each section included in the condition analysis. This GIS view is an excellent tool to quickly show the difference in condition from year to year.

Open Saved Report

If desired, a previously saved report can also be viewed without “rerunning” (i.e. without PAVER recalculating and searching the database for changes). This can save considerable time for long reports. Selecting the Open Saved Report option opens the Windows file search tool that looks specifically for any file with the “.RPC” extension. Highlighting an RPC file and choosing Open brings up the Condition Analysis report and you can work with it as you would any other Condition Analysis report.

M&R

M&R Plan

Configuring the M&R Report

The PAVER Work Plan is a tool for planning, scheduling, budgeting and analyzing alternative pavement maintenance and repair (M&R) activities. The M&R plan utilizes basic inventory data combined with inspection information, maintenance policies, maintenance costs, and predictions about future pavement condition. Work Plan results are specific to your site. All factors used in determining future M&R or construction activity or the associated costs can be configured to reflect your pavement management practices and costs.

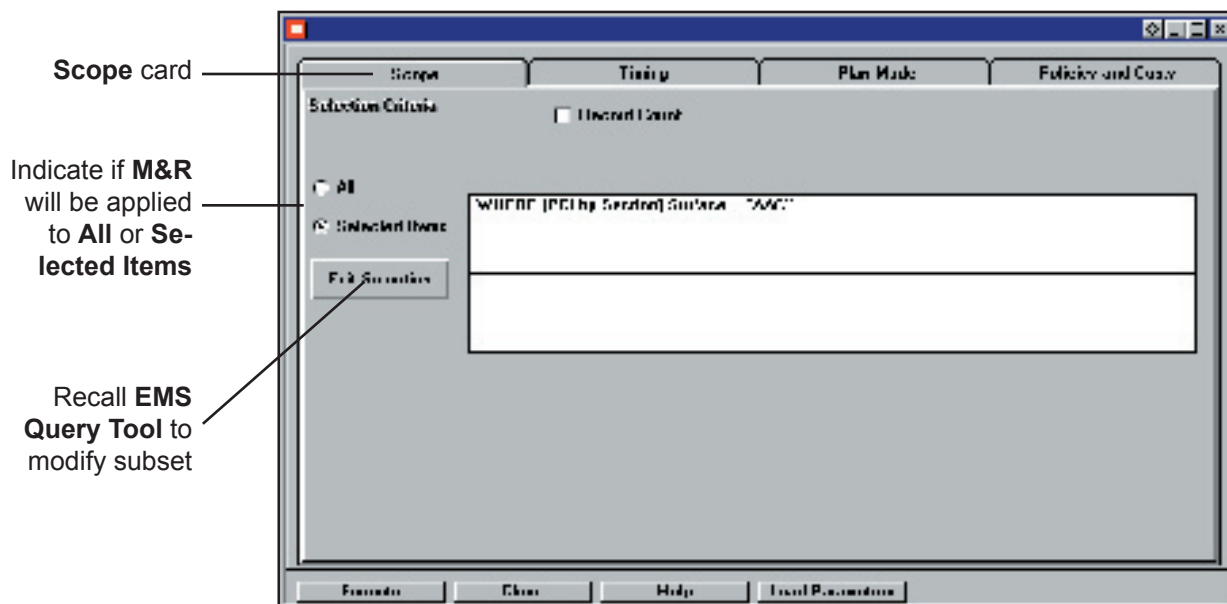
The Work Plan report operates like the Condition Analysis report. When you start the report, a four tab parameter collection window appears on the screen. When the Work Plan report is configured, you execute the report and view the results in the Report Viewer.

Tab 1 - Scope

The Work Plan parameters are configured through the M&R Plan module on the PAVER button bar. The Work Plan configuration window uses an index card style form with the Scope card appearing first. The Work Plan report can be applied to all the sections in your database or you may specify a subset of records. To analyze all sections in your database, use your mouse to select All. To analyze a subset of your pavement sections, click on Selected Items. The EMS Query Tool is launched immediately for you to indicate the subset of pavements that you would like to use. When you specify the Selected Items option, a new button, Edit Selection, appears on the Scope card. If you wish to edit your selection later, clicking this button invokes the EMS Query Tool for you to update your selection. As always, the Record Count check box shows the current section count based on the specific query you are working with.

Tab 2 - Timing

The Timing card is used to specify the start date and number of years the plan will encompass. Entering the Start Year for the Work Plan and the number of Years to analyze specifies report duration. The Start Year field must be entered in mm/dd/yyyy format. Years is simply a numeric value with 1 as the minimum.



Tab 3 - Plan Mode

Note

Selecting the **Consequence Model** option on the **Plan Mode** tab automatically forces the **Years** value on the **Timing** tab to "1".

Three variations of the Work Plan can be used. The first, **Critical PCI Method**, optimizes M&R activity against a specified budget or determines the budget needed to maintain a specified condition level. The second, **Minimum Condition**, measures costs but rations M&R by pavement condition. The third, **Consequence Model**, measures the impact of a localized M&R action over the first year.

To select **Critical PCI Method**, highlight its radio button. Next, select the policies you wish to use in the work plan. The **Localized < Critical** option is used to indicate the use of **Safety M&R** policies. The **Localized < Critical** is used to indicate the use of **Preventative M&R** policies.

Below the maintenance policies are the **Determine Budget Consequence** option and the **Determine Budget Requirements (Iteration)** option. Selecting **Determine Budget Consequence** optimizes M&R activity against a specific budget. The drop-down box next to **Budget** is used to specify one of the **PAVER M&R budget tables** to use with the report. The **Edit** button is used for reviewing and editing the selected budget table or for creating a new table. **Major M&R Priority** lets you set the hierarchy for determining which pavement type and which condition range gets repaired first. To edit or add a new priority table, select the **Edit** button. See [System Tables](#) for further instructions on creating or editing **Budget** or **Major M&R Priority** tables.

Hint

You can create a budget of \$100,000/Year and use the **Budget multiplier** feature in the **M&R Work Plan**.

Selecting **Determine Budget Requirements (Iteration)** allows you to choose between **Backlog elimination in x years** or **Condition Stabilization**. Note that x changes as the work plan duration is changed in the **Timing** tab in **Backlog elimination in x years**. When **Condition Stabilization** is chosen, two more options appear. You must specify either **Maintain Current Area Weighted PCI** or **Reach Preferred Area Weighted PCI**. Finally, specify the maximum number of iterations that **PAVER** uses to calculate the goal.

Note

M&R tables are also accessed through the PAVER Menu. Under the **Tables** menu, select **M&R Plan Tables**.

The Minimum Condition option lets you set the lowest pavement condition (PCI) that is allowed for each pavement rank (P - Primary, S - Secondary, T - Tertiary, etc.). To edit or add a new Minimum Condition table, see [System Tables](#).

The Consequence Model calculates the cost and resulting condition of immediate implementation of local M&R for the year of the most recent inspection. Note that choosing Consequence Model changes the work plan duration in the Timing tab to one year automatically.

Tab 4 - Policies and Costs

Work Plan maintenance policies and work costs are configured on the Policies and Costs card. Notice that if the maintenance policies below Critical PCI Method were chosen on the Plan Mode tab, the same policies are active on this tab.

The drop-down boxes, positioned by the Localized repair options, are used to

Select desired
M&R policies

Select budget
options

Select **Budget**
and **Priority**
tables

The screenshot shows the 'Policies and Costs' tab with the following elements:

- Global PCI Method:** Radio buttons for 'Global', 'Local', and 'Super HMI'.
- Determine Budget/Consequence:** Radio buttons for 'Determine Budget/Consequence' and 'Determine Budget/Requirement: (Global)'.
- Global Consequence Options:** A section containing:
 - Budget:** A dropdown menu with 'Global' selected and an 'Edit' button.
 - Budget Scale Factor:** A text input field with '1.0' and an 'Edit' button.
 - Make M&R Priority:** A dropdown menu with 'Global' selected and an 'Edit' button.
- Minimum Condition:** A radio button option.
- Consequence Model:** A radio button option.
- Buttons at the bottom:** 'Execute', 'Close', 'Help', and 'Load Parameters'.

Minimum
Condition op-
tion

Select and
Edit **Minimum
Condition**
tables

This screenshot shows the 'Policies and Costs' tab with the 'Minimum Condition' option selected. The 'Global Consequence Options' section is visible, and the 'Minimum Condition' dropdown menu is highlighted, showing 'Global Minimum Condition' selected. The 'Consequence Model' radio button is also visible.

select the maintenance policy to apply for Policy < Critical and Policy > Critical M&R. Associated with each maintenance policy is a cost table. You may accept the default selection or specify a custom cost table. The maintenance policies and cost tables are defined in data tables that can be created or edited by clicking on the Edit button that corresponds to the table you are working with, or through the Tables selection on the PAVER Menu. Distress repair work quantities in Micro PAVER are calculated using the table in Appendix H.

Different global maintenance work types can be specified for minimal, climate related, and skid causing types of distresses. The pick lists associated with the three global maintenance labels show the available global repair options and the Interval (policy application interval), Delta (improvement in the condition as measured by years until condition returns to the current state), and Cost (per unit of pavement) associated with each repair option. You may select “none” from the list if you do not wish to perform one or more of the three types of global maintenance.

To edit the global maintenance lists, again click on the corresponding Edit button or choose Tables>M&R Plan Tables>Global M&R from the PAVER Menu. PAVER will display the information to be edited using the Tab Table editor. There are two tables of information used to describe global M&R work. These two tables are Work Types and Cost. To change existing work type description information, simply click on the work type information field desired, and enter the new information. Similarly, to change existing cost information, select the tab for Cost, then select the desired Cost table using the drop-down box at the top of the Cost card, and edit the information directly on the grid. Several different Cost tables may be used in PAVER, even for the same work items. This is because costs may vary depending on whether they are done in-house or by contract, as part of a small job or part of a very large one, for example.

To add new Global M&R table information, you must first understand the relationship between the tables used for Global M&R work. The Work Types card is the master table. In order for cost information to be entered, there must first be a Work Type entry. Cost information can be entered for any of the work types in the Work Types table. Often, cost information will be added only for those work types which you expect to use in your Work Plan. When you choose to add a record in the Cost table, you are asked to choose an existing work type from a list of Work Types already defined. Therefore, if you add a new work type description to the Work Types table and then go to the Cost table and choose to add a new cost item (using the Add button), you will see that your new work type is now on the list of Work Types available to add cost information.

In addition to adding work type descriptions to the Work Types table, and cost information to an existing Cost table, you may also create new named Cost tables using the Add Table button on the Cost card. When you first create a new Cost table, it will be empty, without any information on any work types. Use the Add button on the Cost card to create new records (i.e. rows of cost information) for any work types you desire in your new Cost table.

Major M&R is performed on sections, which have structural distresses at the time of the last inspection. Major M&R is generally only performed on sections with a PCI below the critical PCI or sections that will fail prematurely due to design or construction deficiencies. A different start date option is provided for Major M&R to accommodate design preparation or seasonal delays.

Note

You may create multiple **M&R Cost by Condition** tables.

The cost of Major M&R is determined by the PCI at the time the work is performed. The Cost by Condition table specifies the cost of various categories of repair, including Major M&R. To Edit the Cost by Condition tables select Tables>M&R Plan Tables>Major M&R from the PAVER Menu. Select the Cost by Condition tab from the Major M&R table to set the per unit cost of Major M&R. The Cost by Condition table used in the Work Plan is specified at the top of the Maint. Policies card on the Work Plan form in the M&R Plan.

There is an option to Apply Policies in the First Year. You may check this box if you would like the localized policies to be utilized in the first year of the M&R plan. Otherwise, in year two and beyond, the M&R Cost by Condition table selected will determine localized policies. Also, there is an option at the top of the card to apply an inflation rate. Check this box and input the desired rate.

Once the Work Plan has been configured, clicking the Execute button located on the bottom of the Work Plan configuration form launches the process.

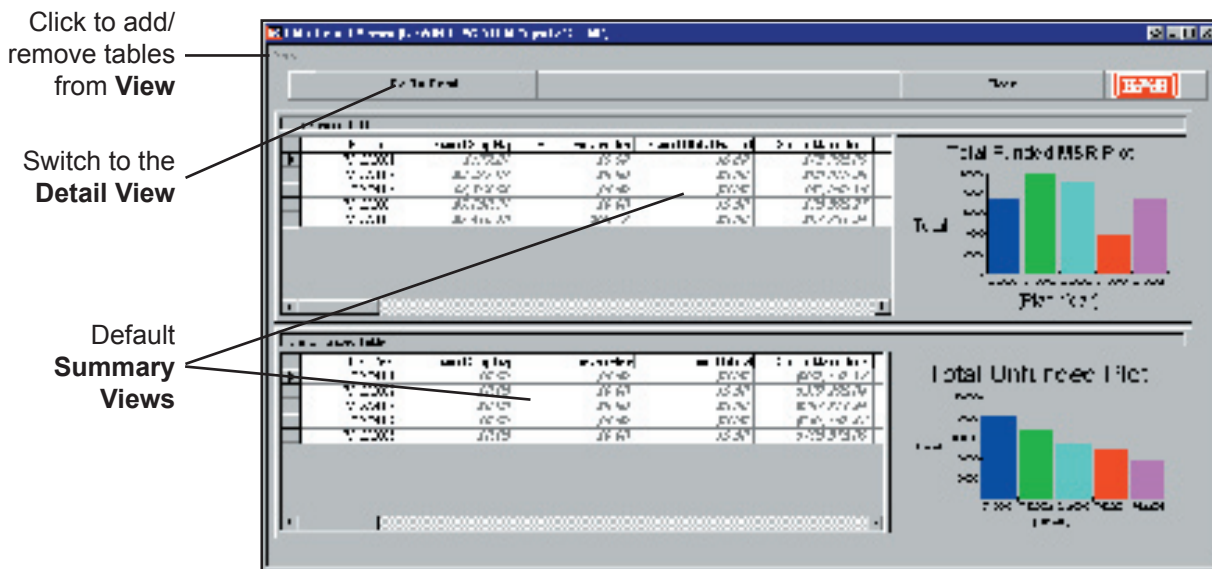
Select Localized M&R policies and costs

Select Global M&R policies and costs

Select Start Year for Major M&R

Analyzing M&R Activity

Once you have configured the Work Plan report, click the **Execute** button to start calculating the report. When the report calculations are completed, the Work Plan report is presented in the Report Viewer tool. The default presentation of the report is a summary of the Work Plan that includes two tables with corresponding graphs. The summary view includes the Condition Distribution Graph (No. of Sections), that shows a breakdown of the number of sections in each condition category - for each year of the report. The Condition Table is accompanied by a graph that plots the conditions over time. The other default table/graph is the Total Funded table. This shows the totals of funds spent for each year of the plan - broken down by work category (e.g. Localized, Global, etc.). Additional Summary Work Plan tables are the Summary Table and the Applied Policy Summary Table.



Summary View Section

The View menu on the PAVER Menu is used to add or remove tables and their associated graphs from the report viewer screen or to switch between the Summary and the Detail version of the report. To turn off one of the Summary tables and their associated graphs, select View>Summary from the PAVER Menu, and then select the table that you want to turn off. Tables or graphs which are active in the current report view have a check mark to the left of the table or graph's name.

Other summary views include:

- **Annual Condition After Repair** - This displays the condition of each branch- and the entire network (or networks if you have more than one) AFTER the recommended work has been performed.
- **Condition Table** - This view shows a “before and after” average condition of all sections included in the current plan and for each year of the plan.
- **Total Funded / Total Unfunded** - These tables show how much money was spent (Funded) and how much PAVER wanted to spend, but did not have the funds (Unfunded). Unfunded work is also referred to as “Backlog”.

- **Summary by Section** - This view shows a combination of things seen in other views, the condition of each section before and after work is performed, the type of work needed, and the cost involved.
- **Applied Policy Summary** - This is a breakdown, in summary form, of each Maintenance Policy, corresponding work description, and associated work quantities, and costs.

Detail View Section

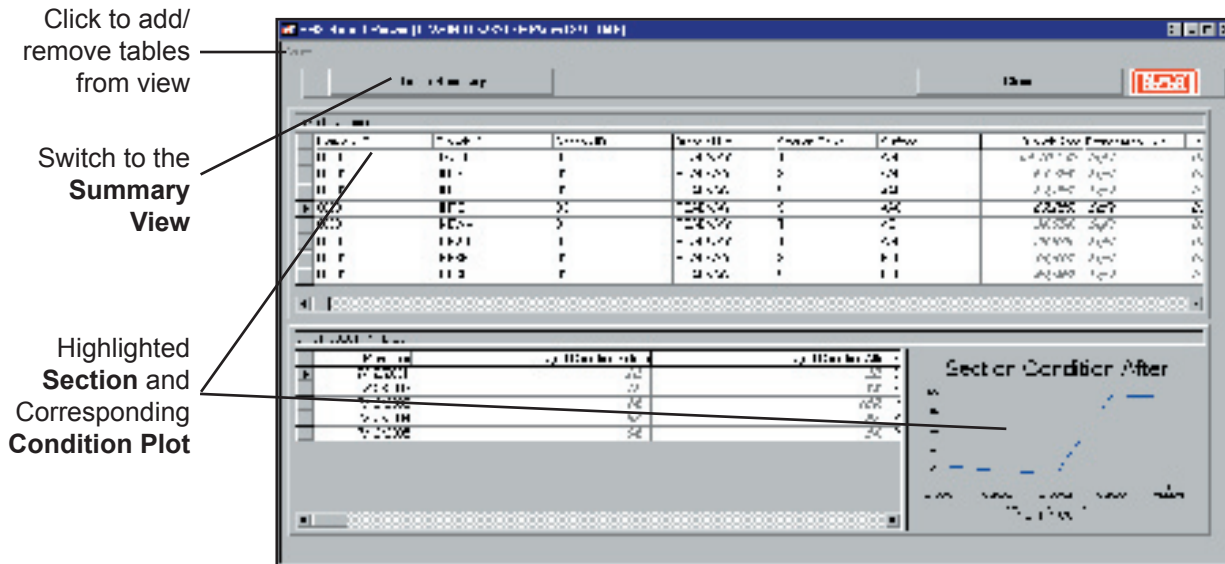
Note

Data shown in the **Summary View** is branch level data while data shown in the **Detail View** is section level data.

The Detail (View>Detail) version of the Work Plan includes the Detail table, Applied Policy Details table, Inventory Items table, Missing Values table, and a table listing the parameter settings used in the report. If the Consequence Model was requested, an additional table titled Applied Policy Consequences is included in the Detail report. Some table definitions include the following:

- **Detail Table** - A breakdown - by section - of the amount of money spent in each work category, and before and after conditions.
 - **Policy Action Details** - A list of distresses encountered (from the last inspection date for each section) and work applied.
 - **Detail Table by Section** - This is the Same as Detail Table, but it includes an associated graph displaying condition.
- As with the Condition Analysis Report, the M&R Report also produces a “Select GIS Views” window that allows you to view three separate, preset GIS views associated with the current M&R Report. The preset views are:
- **“After” condition by Year** - This shows the condition of each section in the report “after” the funding (work) has been applied to that section.
 - **All planned M&R by year** - show a breakdown - by year - of what types of work need to be done (according to the M&R plan) on each section.
 - **Major Planned M&R by year** - same as above, concentrating only on the Major M&R work. Split into two categories: Above Critical (for sections above the critical PCI) and Below Critical (for sections below critical).

Reminder: GIS views are only available if you have linked a coverage to your database (See the chapter on GIS).



Open Saved Report

As with the Condition Analysis reports, you can also save any M & R plan that you run. Again, a primary advantage of doing this is saving the time it takes to execute the report. Depending on the speed of the computer and the parameters of the report and the size of the database, this could be significant. It also provides an easy quick way to compare different reports.

Add-Ins

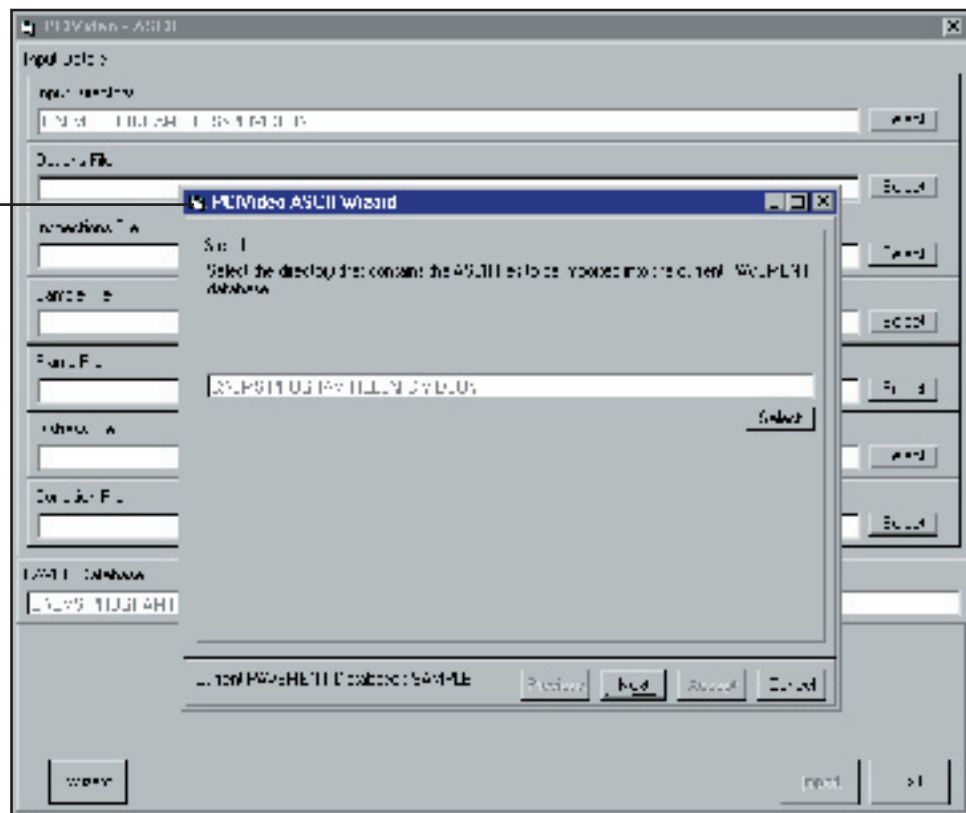
Condition Data Import (ASCII)

The Condition Data Import (ASCII) feature allows you to import data into PAVER using ASCII file format. Upon launching the feature, a file wizard is opened to help guide PAVER towards the appropriate data files. For examples of how to format files for ASCII Video Inspection Import see [Appendix B-1](#).

The ASCII Condition Data Import wizard helps guide PAVER to the correct files

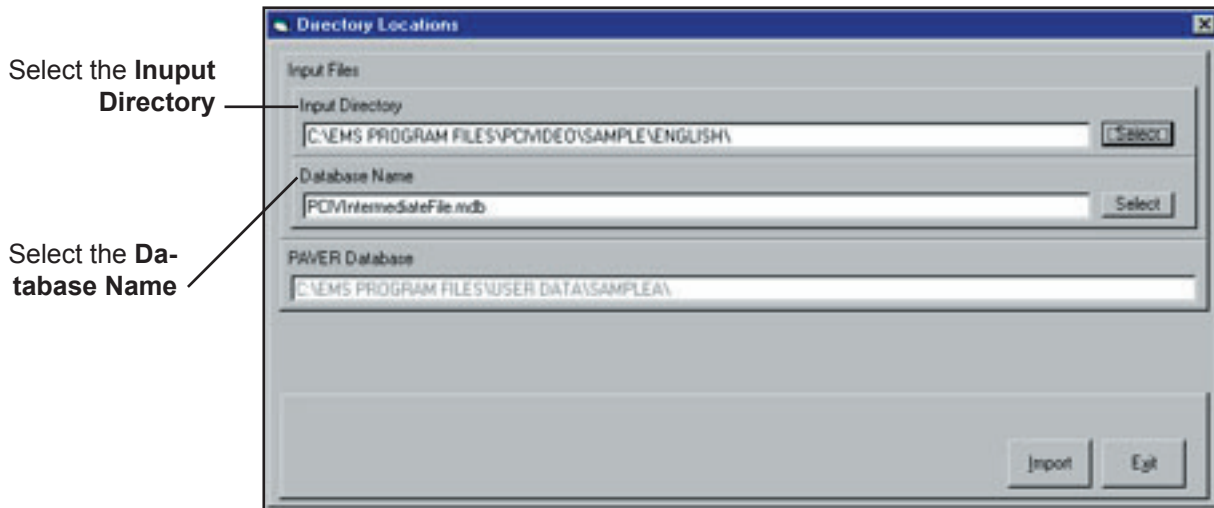
Note

You can either use the wizard to locate the files, or locate the files one by one without the wizard.



Condition Data Import (Database)

The Condition Data Import (Database) feature allows you to import data into PAVER using .mdb file format. Locate the database file that you wish to import by first selecting the Input Directory and then selecting the Database Name. For more information on video inspection import data format for Access Databases see [Appendix B-2](#).



Handheld Data Import

Micro PAVER Inspection Data Entry Using a Windows CE Handheld Device

Hardware/Software Requirements

For the installation of the Handheld PCI Inspector program, a handheld device with the Windows CE operating system and Microsoft Pocket Access is required. In addition, Microsoft Active Sync must be installed on the computer (herein referred to as “main computer”) that inspection information will be downloaded from and uploaded to. Additionally, PAVER must be installed on the main computer.

Software Installation

First, install Microsoft Active Sync on the main computer. Microsoft Active Sync is a free program that can be downloaded from www.microsoft.com. Second, link the handheld device to the main computer by connecting the two via serial port or USB port and launch Microsoft Active Sync. When prompted by Microsoft Active Sync to setup a partnership with this computer select “No”.

Note: A partnership is used when the synchronizing of files on the handheld and PC are desired—this is not necessary for this Micro PAVER application.

To install the necessary software to the handheld device, select the install file from the handheld installation CD.

Basic Software Operation

Process Overview

In an effort to expedite the Pavement Condition Index (PCI) field inspection process, PAVER has the added capability of interacting with Windows CE, handheld devices. This capability was developed as an “add-in” to PAVER and currently ships with Micro PAVER 5.1.

Handheld Data Import is accessed in PAVER through the Add-Ins menu. Data for field inspections can be downloaded from Micro PAVER to a Windows CE, handheld device that has the Handheld PCI Inspector program installed.

Typically when preparing for a field inspection, the first step is to download the sections to be inspected to the Windows CE, handheld device. Data transfer between the main computer and the Windows CE device is facilitated with Microsoft Active Sync. With Microsoft Active Sync, sections to be inspected may be transferred from the main computer to the Windows CE, handheld device using the Download Sections to Inspect tab available through the Micro PAVER Add-Ins menu. Once the appropriate sections are transferred to the handheld device, the handheld device is ready for use in the field.

After the inspection has been completed, the data on the Windows CE, handheld device must be backed-up using the Backup Inspection Data tab that is accessed through the PAVER Add-Ins menu. The backed-up data may then immediately be imported into PAVER or imported at a later date. In order to import the data the third tab labeled Import Backup Data into PAVER is used. During the data import, all distress information is transferred to the appropriate Micro PAVER database on the main computer.

The Handheld Data Import option in the PAVER Add-Ins menu launches a window with three tabs that perform three different tasks. The first tab is used to Download Sections to Inspect. The second tab is used to Backup Inspection Data after an inspection has been performed. The third tab is Import the Backup Data into PAVER. If no device is detected by PAVER, you are only allowed to use the third tab to import previously backed data into PAVER.

Detailed Process

Download Sections to Inspect

When downloading sections to inspect, the user has available three methods to select the sections to download to the handheld device.

1. The first method is to Use PAVER Selections. This method allows the user to select the desired sections using any of the PAVER Selectors such as the Tree Selector. Sections selected using the Tree Selector are automatically placed in the download queue.

2. The second way to choose the sections to download is to Use the Inspection Schedule. This method allows the user to choose sections based upon their inspection schedule. Based on the Inspection Schedule selected, PAVER automatically selects the appropriate sections to inspect.

3. The final method to choose the sections to download is to Use the Query Tool. This method uses the PAVER Query Tool to search for all desired sections.

Current online database

Three methods for locating sections to be downloaded

List of sections selected for download

The screenshot shows the 'Pocket Inspector' window. At the top, it displays the 'Current Online Database' as 'Current: TOLUENIT UL500ULT 14 2004H1 and 2004V14'. Below this are three tabs: 'Download Sections To Inspect', 'Download Inspection Data', and 'Import Backup Data into PAVER'. The 'Download Sections To Inspect' tab is active, showing three radio buttons: 'Use PAVER Selections', 'Use Inspection Schedule', and 'Use Query'. The 'Use Inspection Schedule' option is selected, with a dropdown menu showing '2004S Program - per User job (selected) each job (selected) inspection'. To the right of this dropdown are 'Transfer' and 'Add Items' buttons. Below the radio buttons is a text input field and an 'Add Sections' button. At the bottom of the window is a table titled 'Sections to be Downloaded'.

Section	French	Series	How Sections are	Use
1000	1000	00	10,000.00 AC	1000
1000	1000	00	20,000.00 AC	1000
1000	1000	00	30,000.00 AC	1000
2000	2000	01	20,000.00 AC	2000
2000	2000	01	20,000.00 AC	2000
2000	2000	01	20,000.00 AC	2000

At the bottom of the table are 'Transfer' and 'Copy' buttons.

Note

When sections are downloaded to the handheld device, the data on the handheld device is overwritten. Make sure that all data is backed-up prior to downloading sections.

Once the desired sections are found using the second two methods, click the Add Items button to move the sections into the download queue. To remove a section from the queue, just highlight the row or rows to be removed and click the Remove button. As soon as all the desired sections are queued, click the Transfer button and the sections are downloaded into the handheld program. Note: This overwrites any inspection data that is on the handheld. *Be sure that all data from the handheld has been backed up into Micro PAVER before transferring new data to the handheld.* Fortunately, PAVER alerts the user if data that has not been backed up is about to be overwritten.

Hint

When writing comments or entering data, make sure the cursor is located in the correct box before using the pen recognition function on the handheld device.

Note: When writing a comment, the user must first make sure that the cursor is located in the comment box by first tapping the comment box to make the cursor appear. Any added section, sample or distress may be deleted by clicking the Del button. Sections downloaded from Micro PAVER cannot be deleted. Finally, the user may calculate the PCI for a section by clicking the Calc button on any of the three tabs. In order to see a detailed calculation of the PCI and Structural PCI, the user may elect to see the details by clicking the Details checkbox before performing the calculation. The calculated PCI and Structural PCI can also be seen on the Sections tab after calculations have been done.

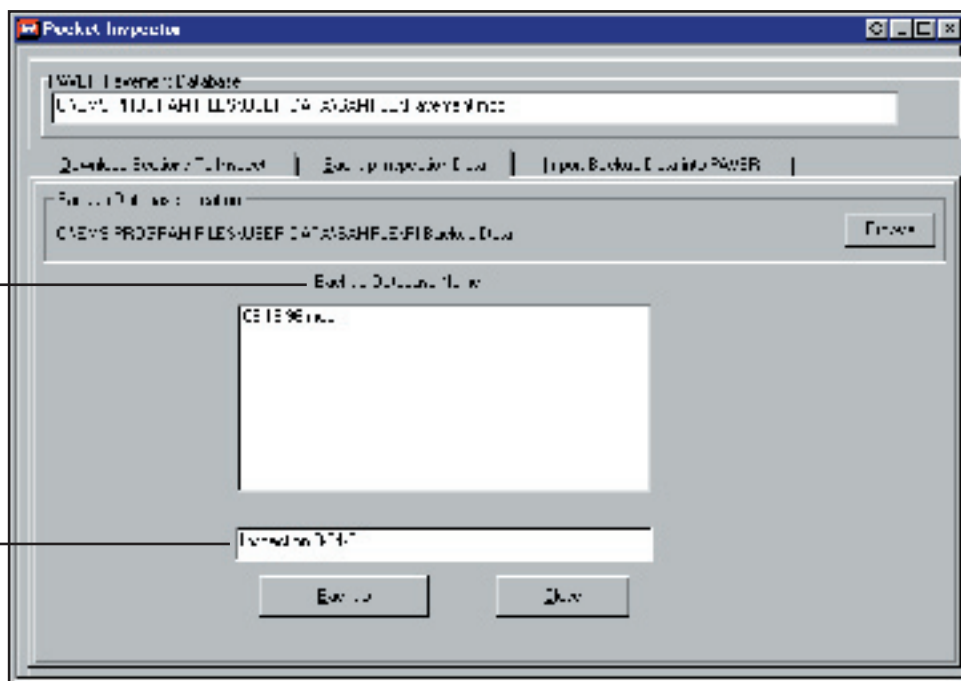
Backup Inspection Data

Once the inspection data has been collected using the handheld device, the user must Backup the Inspection Data using the second tab from the Add-Ins menu. After connecting the handheld device to the main computer using Microsoft Active Sync as before, go to the Add-Ins menu and select Handheld Inspector. Using the second tab, Backup Inspection Data, select the appropriate file to be backed-up. Once a name is selected, click Backup to create the backup file. The backed-up files are automatically placed in the following directory: EMS Program Files\User Data**Name of Current Open Database*\ PI-Backup Data\.

Since the backup files are put in these locations it is important to be in the correct database when backing-up files and importing files from the handheld device.

List of previously backed up databases

Enter desired name for the backup file



Inspections Using the Handheld PCI Inspector

After data has been transferred to the handheld device, field inspections may be carried out using the Handheld PCI Inspector program. The Handheld PCI Inspector program is separated into three tabs: 1. Sections, 2. Samples/Frames, and 3. Distresses.

The Sections tab enables the user to view downloaded sections, add new sections to inspect or add comments. Downloaded and added sections appear in the large text box listed by network, branch, and section names. When adding a new section the user can edit network, branch and section names along with the use, surface, area, number of samples or frames, and age.

Note

For sections downloaded from PAVER, you are only allowed to edit the number of samples or change the evaluation method from samples to frames.

The Samples/Frames tab allows the user to edit or add specific samples/frames. Downloaded samples/frames appear in the large text box. Unlike the Sections Tab, you may delete or edit any downloaded samples/frames. In addition, a sample may be declared to have no distresses by clicking the No Distress checkbox.

The Distresses tab allows the user to enter the distresses for each inspected sample/frame. The current sections and samples/frames are indicated at the top of the screen, and may be switched by clicking the left or right arrows on either side of the section or sample/frame ID. In order to add a new distress, click New. The distress type then can be either picked from the list of distress types or entered into the text box. Distress severities are selected from the pull down menu (if applicable) and distress quantities may be entered directly. In order to save the entered distress data, use Save. If a sample has no distresses, click the No Distresses checkbox. When working with frames, if a new frame is desired click the New Frame button, and a new frame is added with the same attributes as the previous frame.

The following information pertains to all three tabs. When adding a new section, sample, or distress, the user must first click New and then click Save after editing the appropriate fields. The user must also remember to select Save after Editing existing sections, samples, or distresses. Data may be entered by using the keyboard, the number keypad, or handwriting recognition for all data entry text boxes. *Make sure that the cursor is located in the box that you wish to enter data.* When using the number keypad, highlighted text cannot be overwritten – the user must click the C button to clear the text prior to entering the data. Comments may be added to any distress, sample, section, or inspection by clicking on the Comments button and either writing or typing the comment in the box.

Import Backup Data into PAVER

After backup files have been created, the user may then Import Backup Data into PAVER by using the third tab on the Handheld Inspector menu. First select the backup file to import by hitting the Select button and choosing from the list.

Hint

When downloading and importing data, make sure the correct PAVER database is online.

Note: PAVER automatically places and selects files from a default location: EMS Program Files\User Data*Name of Database*\PI-Backup Data\.

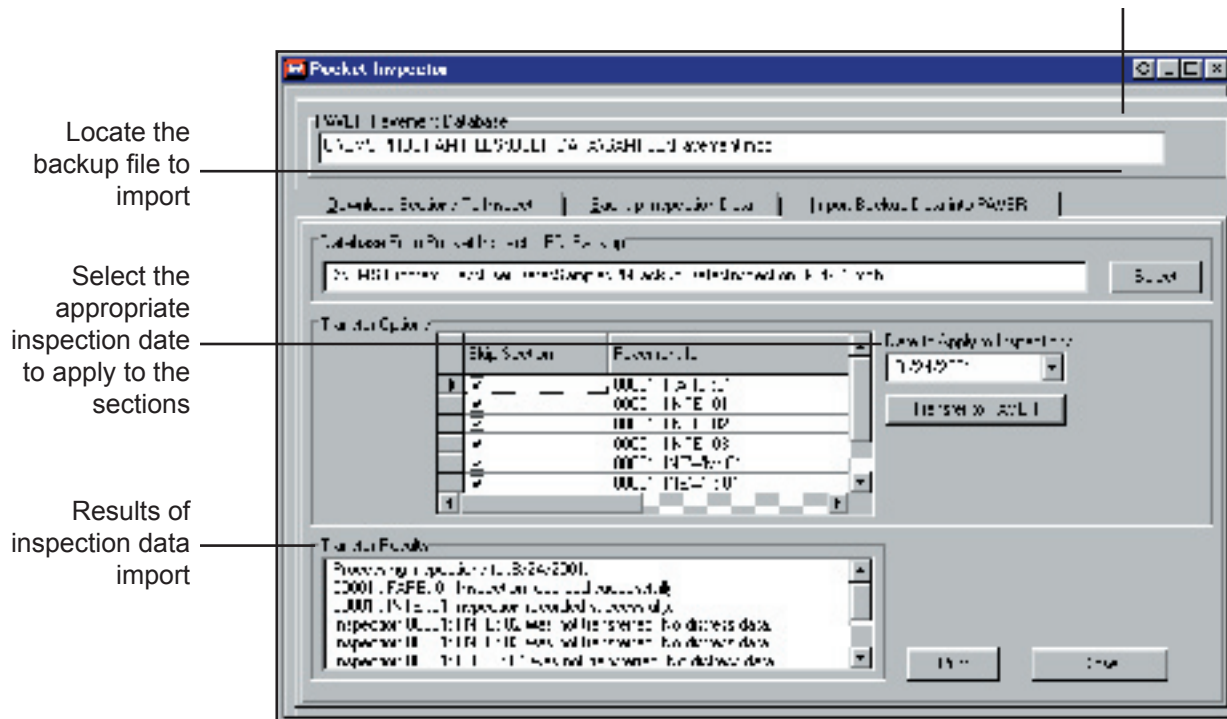
After selecting the backup file, select the inspection date to apply to the data.

Note: If some sections were not inspected or a different inspection date is required for some sections, check the box next to the sections that should be skipped.

Finally, click Transfer to PAVER to transfer the files into PAVER. The transfer results indicate what sections were successfully imported and which ones were not.

Note: if a section has no inspection information, the information is not imported into PAVER for that inspection date.

If desired, the transfer results may be printed by clicking the Print button at the bottom of the tab.



Appendix A

Inspection Information File Format (*Standard and Extended Formats*)

The following description is based on a “Card” model, where the “Cards” are now represented by lines in a text file. Files are in ASCII text, fixed width format. *Note: Micro PAVER 4.1 and later support the extended branch and section number fields.*

07 (AC or GR) and 10 (PCC) Card Format

These cards contain section header information and supplemental inspection. One card required per section inspected.

Field Name	Format	Columns - Standard	Columns - Extended
Form ID	Numeric	1-2	1-2
Inspection Date	MMDDYY	3-8	3-8
Branch Number	Alpha-Numeric	9-13	9-18
Section Number	Alpha-Numeric	14-16	19-28
Add/Change/Delete	Alpha-Numeric	17	29
Riding	Alpha-Numeric	18-20	30-32
Safety	Alpha-Numeric	21-23	33-35
Drainage	Alpha-Numeric	24-26	36-38
Shoulder	Alpha-Numeric	27-29	39-41
Overall	Alpha-Numeric	30-32	42-44
FOD	Alpha-Numeric	33-35	45-47
Total No. of Samples in Section	Numeric	36-38	48-50

Select * from [Plan Parameters]

08 (AC or GR) and 11 (PCC) Card Format

These cards contain sample unit and distress information. One or more cards are required per sample unit inspected and can contain up to four distresses per card. (I.E. A separate card may be used for each distress.) *nnnnn.nn is a decimal number*

Field Name	Format	Columns - Standard	Columns - Extended
Form ID	Numeric	1-2	1-2
Inspection Date	MMDDYY	3-8	3-8
Branch Number	Alpha-Numeric	9-13	9-18
Section Number	Alpha-Numeric	14-16	19-28
Add/Change/Delete	Alpha-Numeric	17	29
Sample Unit ID	Alpha-Numeric	18-20	30-32
Sample Type	Alpha-Numeric	21	33
Area/ No. of Slabs in Sample	nnnnn.nn	22-29	34-41
Distress Code	Numeric	30-31	42-43
Severity	Alpha-Numeric	32	44
Quantity	nnnnn.nn	33-40	45-52
Distress Code	Numeric	41-42	53-54
Severity	Alpha-Numeric	43	55
Quantity	nnnnn.nn	44-51	56-63
Distress Code	Numeric	52-53	64-65
Severity	Alpha-Numeric	54	66
Quantity	nnnnn.nn	55-62	67-74
Distress Code	Numeric	63-64	75-76
Severity	Alpha-Numeric	65	77
Quantity	nnnnn.nn	66-73	78-85

Appendix B-1

Video Inspection Import Data Format (ASCII Text)

File Specifications for PCIVideo Interface to PAVER

Example User Interfaces

PCIVasc2PVR.exe

User interface for the use of Distress Data collected into ASCII files. It is recommended that the complete parameter string be enclosed in quotes ("").

Command Line Parameters:

PVR=C:\EMS Program Files\	
PDIR=C:\EMS Program Files\User Data\Sample\	Directory containing the PAVER PAVEMENT.MDB
IDIR=C:\EMS Program Files\PCIVideo	Directory containing the ASCII text files
INSP=PCIVInspection.txt	File containing Inspection information
SAMP=PCIVSample.txt	File containing Sample information
FRAM=PCIVFrame.txt	File containing Frame information
DIST=PCIVDistress.txt	File containing Distress information
COND=PCIVCondition.txt	File containing Condition information
OPTN=PCIVOptions.txt	File containing PCIVideo options
INTERACTIVE	If present, force display of UI

PCIVdb2PVR.exe

User interface for the use of Distress Data collected into an pre-configured Access database. It is recommended that the complete parameter string be enclosed in quotes ("").

Command Line Parameters:

PVR=C:\EMS Program Files\	
PDIR=C:\EMS Program Files\User Data\Sample\	Directory containing the PAVER PAVEMENT.MDB
IDIR=C:\EMS Program Files\PCIVideo	Directory containing PCIVIntermediateFile.mdb
INTERACTIVE	If present, force display of UI

Six text files are needed to perform an import of video inspection data.
The following file formats support the import of collected frame distress data.

- Fields are separated by commas
- Strings are enclosed by quotes
- Dates are enclosed by pound signs
- Network, Branch, and Section are separated by 2 colons
- Optional fields may be blank but present

PCIVideoOptions.txt

Line 1:
FieldA,FieldB,FieldC
"Metric","Data collected in contract #xxx","PID"

Line 2..n: (Optional)
FieldA
Spacer:00000
DEFAULTFRAMESIZE:260
DEFAULTFRAMEUNITS:SQF

Where:

Line 1:

FieldA Data values were collected in "English" or "Metric"
FieldB Comment to associate with the execution of this process.
FieldC Method of data association (Uniqueld / PID / SID)

PCIVideoInspection.txt

FieldA,FieldB,FieldC,FieldD,FieldE
"RSPARK::IFARB:01",#6/5/2000#,"optional",4,"optional"

Where:

FieldA The identifier of the section which "owns" this inspection NETWORKID::BRANCHID::
SECTIONID
SPACER
FieldB Identifies the date common to all data from this inspection (multi-day inspections just pick
a day)
FieldC Usually some observations resulting from inspection.
FieldD How many samples in the inspection.
FieldE Indicates the origin of the inspection data

PCIVideoSample.txt

FieldA,FieldB,FieldC,FieldD,FieldE,FieldF,FieldG
"RSPARK::IFARB:01",#6/5/2000#,"1SMP2","R",52.95,"SqM","Sample Comment"

Where:

FieldA The identifier of the section which "owns" this inspection NETWORKID::BRANCHID::
SECTIONID
SPACER
FieldB Identifies the date common to all data from this inspection (multi-day inspections just pick
a day)
FieldC Assigned by video vendor for this video sample (must be unique within section and in-
spection date)

FieldD	Size of Sample
FieldE	Unit of measure (as defined in PAVER) for the Sample Size
FieldF	Survey or Detail Comment regarding Sample

PCIVideoFrame.txt

```
FieldA,FieldB,FieldC,FieldD,FieldE,FieldF,FieldG,FieldH,FieldI,FieldJ
"RSPARK::IFARB:01",#6/5/2000#,"1FRM2","","52.95","SqM","START","END","LATITUDE","LONGITUDE"
```

Where:

FieldA	The identifier of the section which "owns" this inspection NETWORKID::BRANCHID:: SECTIONID SPACER
FieldB	Identifies the date common to all data from this inspection (multi-day inspections just pick a day)
FieldC	Assigned by video vendor Identifier for this video frame (must be unique within section and inspection date)
FieldD	Identifies this sample (optional)
FieldE	Size of Frame
FieldF	Unit of measure (as defined in PAVER) for the Frame Size
FieldG	Distance from start of film to begin of inspection frame (optional)
FieldH	Distance from start of film to end of inspection frame (optional)
FieldI	LATITUDE-GPS String of Degree, Minutes, Seconds (optional)
FieldJ	LONGITUDE -GPS String of Degree, Minutes, Seconds (optional)

PCIVideoDistress.txt

```
FieldA,FieldB,FieldC,FieldD,FieldE,FieldF,FieldG,FieldH,FieldI,FieldJ
"RSPARK::IFARB:01",#6/5/2000#,"","1FRM2", 7 ,"H", 1.46304001808166 ,"M","EDGE CRACKING"
```

Where:

FieldA	The identifier of the section which "owns" this inspection NETWORKID::BRANCHID:: SECTIONID SPACER
FieldB	Identifies the date common to all data from this inspection (multi-day inspections just pick a day)
FieldC	Sample number which owns this distress (if any)
FieldD	Assigned by video vendor Identifier for this video frame (must be unique within section and inspection date)

FieldE	The distress code as used in PAVER (integer)
FieldF	H, M, L (if severity is used for the given distress code)
FieldG	The quantity of the distress (for Distress numbers with quantity defined)
FieldH	Unit of measure (as defined in PAVER) for the quantity
FieldI	Available for any comment/observation by the data collector (optional)

PCIVideoCondition.txt

```
FieldA,FieldB,FieldC,FieldD,FieldE,FieldF,FieldG,FieldH
"RSPARK::IFARB:01",#6/5/2000#,"","", 21 ,"","IRI","Automated data collection"
```

Where:

FieldA	The identifier of the section which "owns" this inspection NETWORKID::BRANCHID::SECTIONID SPACER
FieldB	Identifies the date common to all data from this inspection (multi-day inspections just pick a day)
FieldC	Sample number which owns this distress (if any)
FieldD	Assigned by video vendorIdentifier for this video frame (must be unique within section and inspection date)
FieldE	The Numeric Condition value to be recorded. Only populate FieldE or FieldF as determined by the data type for the Condition Method.
FieldF	The Textural Condition value to be recorded.
FieldG	The Condition Method (IRI / PCI / PCIV / etc.)
FieldH	Source of the Condition value. (optional)

Units of Measure valid for PCIVideo

<u>UNIT</u>	<u>System</u>
F	English
FT	English
LF	English
SF	English
SQF	English
SQFT	English
M	Metric
SM	Metric
SQM	Metric
COUNT	Metric or English
SLAB	Metric or English
SLABS	Metric or English

Appendix B-2

Video Inspection Import Data Format (Access Database)

There are five data tables that can be created in Microsoft Access to input data. They include the following:

- PCIVideoDistress
- PCIVideoCondition
- PCIVideoInspection
- PCIVideoSample
- PCIVideoFrame

At least one of the two tables in bold type are required. Optional tables can be used to record additional descriptive data if available. In general, data values that have been filled in are required and those listed as optional can be omitted.

The screenshot displays the Microsoft Access interface with five data tables open. Each table has a header row and one or more data rows. The tables are:

- PCIVideoInspection : Table**

SUniqueID	Date	Comment
SID	1/1/99	optional
- PCIVideoSample : Table**

SUniqueID	Date	SAMPLENR	SAMPLETYPE	Size	Units	Comments
SID 001	1/1/99	Reqd	optional	500	????	optional
- PCIVideoFrame : Table**

FrameID	SUniqueID	Date	SAMPLENR	XXXX
FR 001	SID 001	1/1/99	optnl	????
- PCIVideoDistress : Table**

SUniqueID	Date	SampleNR	FrameID	Distress	Description	SEVERITY	Units	Comments	QUANTITY	Quar
SID 001	1/1/99	optnl	(optional)	1	(optional)	H	optional	optional	23	option
- PCIVideoCondition : Table**

SUniqueID	Date	SampleNR	FrameID	Condition	TextValue	Method
SID 001	1/1/99	optnl	(optional)	55	55	PCIV
SID 001	1/1/99	optnl	(optional)	25	(optional)	IRI

Appendix C

Abbreviations of Surface Types

Abbreviation	Complete Name	Distress Manual Reference
AAC	Asphalt overlay over asphalt concrete	Asphalt
ABR	Asphalt over brick	Asphalt
AC	Asphalt concrete	Asphalt
ACT	Asphalt over cement treated base	Asphalt
APC	Asphalt overlay over Portland cement concrete	Asphalt
APZ	Asphalt over pozzolanic base	Asphalt
BR	Brick	Asphalt
COB	Cobblestone	Asphalt
GR	Gravel	Unsurfaced
PCC	Portland cement concrete	Concrete
PVB	Paving blocks	Asphalt
ST	Surface treatment	Asphalt
X	Other	Unsurfaced

Appendix D

Pavement Data Exchange (PDE) Format

OBJECT	NAME	DATA TYPE	DATA SIZE	USAGE
Table	SITE			SITE.DBF (PAVER Database and Contact Information)
Field	AGENCY	Text	61	PAVER Agency responsible for data maintenance
Field	SECUR	Text	25	*INTERNAL USE* *VALUE NOT REQUIRED*
Field	UNIT	Text	7	Data units in "ENGLISH" or "METRIC"
Field	NAME	Text	25	PAVER Data Coordinator Name
Field	ADDR	Text	52	PAVER Data Coordinator Address
Field	CTYSTA	Text	30	PAVER Data Coordinator City and State
Field	ZIPCODE	Text	10	PAVER Data Coordinator Zip Code
Field	PHONE	Text	21	PAVER Data Coordinator Phone Number
Field	PASSWRD	Text	8	*INTERNAL USE* *VALUE NOT REQUIRED*
Field	AGENCYID	Text	5	PAVER Agency Id
Table	FAMILY			FAMILY.DBF (Family Models)
Field	FAMILY	Text	20	Model name.
Field	MAXAGE	Number (Double)	8	Max age to be used for model.
Field	COEFF1	Number (Double)	8	Model 1st coefficient.
Field	COEFF2	Number (Double)	8	Model 2nd coefficient.
Field	COEFF3	Number (Double)	8	Model 3rd coefficient.
Field	COEFF4	Number (Double)	8	Model 4th coefficient.
Table	POLICY1			POLICY1.DBF (Maintenance Policy Names)
Field	POLICY	Number (Double)	8	Maintenance policy Id
Field	DESCRIPT	Text	30	Description of maintenance policy
Table	POLICY2			POLICY2.DBF (Maintenance Policy Details)
Field	POLICY	Number (Double)	8	Maintenance policy Id
Field	DISTRESS	Number (Double)	8	Distress for policy consideration
Field	SEVERITY	Text	1	Distress severity for policy consideration
Field	WORKTYPE	Text	5	Work type considered for distress and severity
Field	MATERIAL	Number (Double)	8	Material type considered for distress and severity
Field	EXTRA1	Number (Double)	8	*INTERNAL USE* *VALUE NOT REQUIRED*
Field	EXTRA2	Number (Double)	8	*INTERNAL USE* *VALUE NOT REQUIRED*
Field	UNITCOST	Number (Double)	8	Cost per work type unit
Table	NETWORK			NETWORK.DBF (Pavement Network Inventory)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	NAME	Text	61	Description of pavement network.
Field	NSORT1	Text	10	Supplemental value for selecting networks
Field	NSORT2	Text	10	Supplemental value for selecting networks
Field	NSORT3	Text	10	Supplemental value for selecting networks

OBJECT	NAME	DATA TYPE	DATA SIZE	USAGE
Table	BRANCH			BRANCH.DBF (Pavement Branch Inventory)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	NAME	Text	25	Description of pavement branch.
Field	USE	Text	10	Branch use. ROADWAY, APRON, RUNWAY, TAXI WAY, Etc.
Field	SECTIONS	Number (Double)	8	Number of pavement sections in the branch.
Field	AREA	Number (Double)	8	Total area of all sections in the branch.
Field	COMMENTS	Text	70	Any additional comments about the branch.
Field	BSORT1	Text	10	Supplemental value for selecting branches
Field	BSORT2	Text	10	Supplemental value for selecting branches
Field	BSORT3	Text	10	Supplemental value for selecting branches
Table	SECTION			SECTION.DBF (Pavement Section Inventory)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	FROM	Text	25	Starting location of pavement section
Field	TOO	Text	25	Ending location of pavement section
Field	ZONE	Text	4	User specified indicator for funding sources, maintenance areas, etc.
Field	CATEGORY	Text	1	Section category (A-Z, 0-9)
Field	RANK	Text	1	Pavement rank (A=Principal, B=Arterial, C=Collector, D=Industrial, E=Residential, N=Not Applicable, P=Primary, S=Secondary, T=Tertiary, X=Other)
Field	SURFACE	Text	10	Surface type (AAC, ABR, AC, ACT, APC, APZ, BR, COB, GR, PCC, PVB, ST, X)
Field	SECLN	Number (Double)	8	Section Length
Field	SECWID	Number (Double)	8	Section Width
Field	SECAREA	Number (Double)	8	Section Area
Field	SLABLEN	Number (Double)	8	Slab length
Field	SLABWID	Number (Double)	8	Slab width
Field	NUMSLAB	Number (Double)	8	Number of slabs
Field	JOINTLEN	Number (Double)	8	Slab joint length
Field	LCD	Date/Time	8	Last construction date
Field	LID	Date/Time	8	Last inspection date
Field	LPCI	Number (Double)	8	Last inspection PCI condition
Field	FAMILY	Text	8	Family model assigned to section
Field	SHOULDER	Text	3	Shoulder type
Field	STRTYPE	Text	3	Street type
Field	GRADE	Number (Double)	8	Pavement grade in degrees
Field	LANES	Number (Double)	8	Number of lanes in section
Field	SSORT1	Text	10	Supplemental value for selecting sections
Field	SSORT2	Text	10	Supplemental value for selecting sections
Field	SSORT3	Text	10	Supplemental value for selecting sections

OBJECT	NAME	DATA TYPE	DATA SIZE	USAGE
Table	SAMPLE			SAMPLE.DBF (Inspection Sample Details)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	INSDAT	Date/Time	8	Date of inspection.
Field	SAMPLE	Text	10	Sample Id
Field	TYPE	Text	1	Sample type R=Random A=Additional
Field	SIZE	Number (Double)	8	Sample size, area or slabs
Field	PCI	Number (Double)	8	Sample PCI Condition
Field	DISTRESS	Number (Double)	8	Distress code
Field	SEVERITY	Text	1	Distress severity
Field	QTY	Number (Double)	8	Quantity of distress
Table	XDIST			XDIST.DBF (Inspection Extrapolated Distress Information)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	INSDAT	Date/Time	8	Date of inspection.
Field	DISTRESS	Number (Double)	8	Distress code
Field	SEVERITY	Text	1	Distress severity
Field	QTY	Number (Double)	8	Quantity of distress
Field	DENSITY	Number (Double)	8	Density of distress for severity
Field	DEDUCT	Number (Double)	8	PCI points to deduct for this distress for severity
Table	CONDHIST			CONDHIST.DBF (Inspection Summary Results)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	INSDAT	Date/Time	8	Date of inspection.
Field	RIDE	Text	3	Condition rating: Ride Quality
Field	SAFETY	Text	3	Condition rating: Safety
Field	DRAIN	Text	3	Condition rating: Drainage Condition
Field	SHOULDER	Text	3	Condition rating: Shoulder Quality
Field	OVERALL	Text	3	Condition rating: Overall Condition
Field	FOD	Text	3	Condition rating: Foreign Object Damage
Field	SAMPLES	Number (Double)	8	Samples in section
Field	SAMPLE	Number (Double)	8	Samples in section
Field	PCI	Number (Double)	8	Condition rating: PCI
Field	RANDOM	Number (Double)	8	Random samples in section
Field	ADDITION	Number (Double)	8	Additional samples in section
Field	MINSAM	Number (Double)	8	Minimum number of samples recommended for section
Field	PCISTA	Number (Double)	8	*INTERNAL USE* *VALUE NOT REQUIRED*
Field	LOAD	Number (Double)	8	Percent of distress due to: LOAD
Field	CLIMATE	Number (Double)	8	Percent of distress due to: CLIMATE
Field	OTHER	Number (Double)	8	Percent of distress due to: OTHER

OBJECT	NAME	DATA TYPE	DATA SIZE	USAGE
Table	TRAFFIC			TRAFFIC.DBF (Traffic survey Details)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	SURVEY	Date/Time	8	Starting date of traffic survey
Field	AIRTYPE	Text	15	(Airfields) Aircraft model
Field	ANNDEP	Number (Double)	8	(Airfields) Annual number of departures
Field	AVDAILY	Number (Double)	8	(Airfields) Average number of daily departures
Field	PERDESGN	Number (Double)	8	(Roadways) Percent of traffic in design lane
Field	PER2AT	Number (Double)	8	(Roadways) Percent of twin axle trucks in design lane
Field	PER3AT	Number (Double)	8	(Roadways) Percent of trucks with 3 or more axles in design lane
Field	ESAL	Number (Double)	8	(Roadways) Annual ESAL in design lane
Field	COMMENT	Text	70	Comments related to traffic survey
Field	ENDDATE	Date/Time	8	Ending date of traffic survey
Table	MATPRO			MATPRO.DBF (Layer and Materials Testing Details)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	LAYER	Text	10	Layer type: OVERLAY, SURFACE, BASE, SUB-SUBGRADE
Field	TESTTYPE	Text	50	Test type
Field	TESTDATE	Date/Time	8	Date of test
Field	TESTLOC	Text	10	Location of test
Field	TESTVAL	Text	10	Result value of test
Field	DEPTH	Number (Double)	8	Depth from layer surface
Field	COMMENT	Text	70	Comments related to Material Test
Table	WORREQ			WORKREQ.DBF (Pavement Work Required Details)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	WORKTYPE	Text	5	Work type code
Field	STADATE	Date/Time	8	Date to start project
Field	IDDATE	Date/Time	8	Proposed date to start project
Field	PROPOSAL	Text	12	Proposal Id
Field	PHASE	Text	2	Project phase
Field	ACCOMP	Text	1	Manner Accomplished I=Inhouse C=Contractor
Field	QTY	Number (Double)	8	Quantity of work type to be performed
Field	COST	Number (Double)	8	Cost based on work type and quantity
Field	MATERIAL	Number (Double)	8	Material type used for work type
Field	THICK	Number (Double)	8	Thickness of material
Field	COMMENT	Text	70	Comments related to project

OBJECT	NAME	DATA TYPE	DATA SIZE	USAGE
Table	WORKHIST			WORKHIST.DBF (Pavement Work History Details)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	WORKTYPE	Text	5	Work type code
Field	COMPLETE	Date/Time	8	Date work completed
Field	MATERIAL	Number (Double)	8	Material type used for work type
Field	THICK	Number (Double)	8	Thickness of material
Field	ACCOMP	Text	1	Manner Accomplished I=Inhouse C=Contractor
Field	QTY	Number (Double)	8	Quantity of work type to be performed
Field	COST	Number (Double)	8	Cost based on work type and quantity
Field	COMMENT	Text	70	Comments related to project
Field	STADATE	Date/Time	8	Date project started
Field	IDDATE	Date/Time	8	Proposed date to start project
Field	PROPOSAL	Text	12	Proposal Id
Field	PHASE	Text	2	Project phase
Table into	NDT1			NDT1.DBF (FWD Testing Summary)(Not imported PAVER 4.0)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	LOCATION	Number (Double)	8	Area tested. (Center, Wheel Path, Edge Loading, Corner, Etc.)
Field	STATION	Number (Double)	8	Station number tested
Field	TESTDATE	Date/Time	8	Date of testing
Field	TEMP	Number (Double)	8	Air temperature
Field	LOAD	Number (Double)	8	Test load in kilograms
Field	MAXDEF	Number (Double)	8	Maximum deflection in mils
Field	TRANSFER	Number (Double)	8	Load transfer in percent
Field	TESTTYPE	Text	1	NDT type: D=Design, A=Average
Table	NDT2			NDT2.DBF (FWD Testing Detail)(Not imported into PAVER 4.0)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	LOCATION	Number (Double)	8	Area tested. (Center, Wheel Path, Edge Loading, Corner, Etc.)
Field	STATION	Number (Double)	8	Station number tested
Field	TESTDATE	Date/Time	8	Date of testing
Field	TEMP	Number (Double)	8	Air temperature
Field	LOAD	Number (Double)	8	Test load in kilograms
Field	SENSOR	Number (Double)	8	Sensor measured
Field	DISTANCE	Number (Double)	8	Sensor distance from load
Field	DEFLECT	Number (Double)	8	Sensor deflection in mils

Appendix E

Example Pavement Survey Forms

Included on the following pages are some example forms for surveying asphalt and concrete pavements. The six example forms are:

- Concrete Surfaced Roads and Parking Lots
- Asphalt Surfaced Roads and Parking Lots
- Airfield Concrete Pavement
- Airfield Asphalt Pavement
- Unsurfaced Roads
- Deduct Values

Concrete Surfaced Roads and Parking Lots

ROADWAY CONCRETE PAVEMENT CONDITION SURVEY DATA SHEET							
PID				INSPECTOR NAME			
FROM				BRANCH USE		DATE INSPECTED	
TO				SECTION WIDTH		SECTION LENGTH	
SLAB WIDTH		SLAB LENGTH		NUMBER OF SLABS			
PCC Surfaced Distress Codes							
21. Blow up/Buckling		26. Joint Seal		31. Polished Aggregate		36. Scaling	
22. Corner Break		27. Lane/Shoulder		32. Poouts		37. Shrinkage	
23. Divided Slab		28. Linear Cracking		33. Pumping		38. Spalling Corner	
24. Durability Crack		29. Patching (Large)		34. Punchout		39. Spalling Joint	
25. Faulting		30. Patching (Small)		35. Railroad Crossing			
SAMPLE NUMBER				SLABS IN SAMPLE			
DISTRESS CODE				Sketch / Comments			
L				M			
H							
SAMPLE NUMBER				SLABS IN SAMPLE			
DISTRESS CODE				DISTRESS CODE			
L				L			
M				M			
H				H			

Asphalt Surfaced Roads and Parking Lots

ROADWAY ASPHALT PAVEMENT CONDITION SURVEY DATA SHEET							
PID				INSPECTOR NAME			
FROM				BRANCH USE		DATE INSPECTED	
TO				SECTION WIDTH		SECTION LENGTH	
AC Surfaced Distress Codes							
1. Alligator Cracking Sq Ft		6. Depression Sq Ft		11. Patching & Util Cut Patching Sq Ft		16. Shoving Sq Ft	
2. Bleeding Sq Ft		7. Edge Cracking Ft		12. Polished Aggregate Sq Ft		17. Slippage Cracking Sq Ft	
3. Block Cracking Sq Ft		8. Jt. Reflection Cracking Ft		13. Potholes Count		18. Swell Sq Ft	
4. Bumps and Sags Ft		9. Lane/Shoulder Drop Off Ft		14. Railroad Crossing Sq Ft		19. Weathering/Ravelling Sq Ft	
5. Corrugation Sq Ft		10. Long & Trans Cracking Ft		15. Rutting Sq Ft			
SAMPLE NUMBER				SAMPLE AREA			
DISTRESS CODE	L	M	H	Sketch / Comments			
SAMPLE NUMBER				SAMPLE AREA			
DISTRESS CODE	L	M	H	DISTRESS CODE	L	M	H

Airfield Concrete Pavements

AIRFIELD CONCRETE PAVEMENT CONDITION SURVEY DATA SHEET							
PID				INSPECTOR NAME			
FROM				BRANCH USE		DATE INSPECTED	
TO				SECTION WIDTH		SECTION LENGTH	
SLAB WIDTH		SLAB LENGTH		NUMBER OF SLABS			
PCC Surfaced Distress Codes							
61. Blow up		65. Joint Seal Damage		69. Pumping		73. Shrinkage Crack	
62. Corner Break		66. Patching, 5 Sf		70. Scaling/Map Crack/Crazing		74. Spalling-Joints	
63. Long/Trans/Diagonal Crack		67. Patching/Utility Cut		71. Settlement/Fault		75. Spalling-Corner	
64. Durability Crack		68. Popouts		72. Shattered Slab			
SAMPLE NUMBER		SLABS IN SAMPLE		Sketch / Comments			
DISTRESS CODE	L	M	H				
SAMPLE NUMBER		SLABS IN SAMPLE		SAMPLE NUMBER		SLABS IN SAMPLE	
DISTRESS CODE	L	M	H	DISTRESS CODE	L	M	H

Airfield Asphalt Pavements

AIRFIELD ASPHALT PAVEMENT CONDITION SURVEY DATA SHEET							
PID				INSPECTOR NAME			
FROM				BRANCH USE		DATE INSPECTED	
TO				SECTION WIDTH		SECTION LENGTH	
AC Surfaced Distress Codes							
41. Alligator Cracking Sq Ft		45. Depression Sq Ft		49. Oil Spillage Sq Ft		53. Rutting Sq Ft	
42. Bleeding Sq Ft		46. Jet Blast Sq Ft		50. Patching Sq Ft		54. Shoving from PCC Sq Ft	
43. Block Cracking Sq Ft		47. Jt. Reflection (PCC) Ft		51. Polished Aggregate Sq Ft		55. Slippage Cracking Sq Ft	
44. Corrugation Sq Ft		48. Long. & Trans. Cracking Ft		52. Raveling/Weathering Sq Ft		56. Swell Sq Ft	
SAMPLE NUMBER				SAMPLE AREA			
DISTRESS CODE	L	M	H	Sketch / Comments			
SAMPLE NUMBER				SAMPLE AREA			
DISTRESS CODE	L	M	H	DISTRESS CODE	L	M	H

Unsurfaced Roads

UNSURFACED ROADS CONDITION SURVEY DATA SHEET																																																																																							
PID				INSPECTOR NAME																																																																																			
FROM				BRANCH USE		DATE INSPECTED																																																																																	
TO				SECTION WIDTH		SECTION LENGTH																																																																																	
Unsurfaced Distress Codes																																																																																							
81. Improper Cross Section Linear Ft				85. Potholes Count																																																																																			
82. Inadequate Roadside Drainage Sq Ft				86. Ruts Sq Ft																																																																																			
83. Corrugations Sq Ft				87. Loose Aggregate Linear Ft																																																																																			
84. Dust																																																																																							
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Deduct Values

No.	DEDUCT VALUES												TOTAL	q	CDV
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															

Appendix F

Load & Climate Distresses

Asphalt Surfaced Roads and Parking Lots

<u>Pavement Distress</u>	<u>Distress Type</u>
1. Alligator Cracking	Load
2. Bleeding	Other
3. Block Cracking	Climate/Durability
4. Bumps & Sags	Other
5. Corrugation	Other
6. Depression	Other
7. Edge Cracking	Load
8. Joint Reflection Cracking	Climate/Durability
9. Lane/Shoulder Drop Off	Other
10. Longitudinal/Transverse Cracking	Climate/Durability
11. Patch/Utility Cut	Other
12. Polished Aggregate	Other
13. Pothole	Load
14. Railroad Crossing	Other
15. Rutting	Load
16. Shoving	Other
17. Slippage Cracking	Other
18. Swell	Other
19. Weathering/Raveling	Climate/Durability

Concrete Surfaced Roads and Parking Lots

<u>Pavement Distress</u>	<u>Distress Type</u>
21. Blow Up	Climate/Durability
22. Corner Break	Load
23. Divided Slab	Load
24. Durability Cracking	Climate/Durability

25. Faulting	Other
26. Joint Seal Damage	Climate/Durability
27. Lane/Shoulder Drop Off	Other
28. Linear Cracking	Load
29. Large Patch/Utility Cut	Other
30. Small Patch	Other
31. Polished Aggregate	Other
32. Popouts	Other
33. Pumping	Other
34. Punchout	Load
35. Railroad Crossing	Other
36. Scaling/Crazing	Other
37. Shrinkage Cracking	Climate/Durability
38. Corner Spalling	Climate/Durability
39. Joint Spalling	Climate/Durability

Asphalt Surfaced Airfields

<u>Pavement Distress</u>	<u>Distress Type</u>
41. Alligator Cracking	Load
42. Bleeding	Other
43. Block Cracking	Climate/Durability
44. Corrugation	Other
45. Depression	Other
46. Jet Blast	Other
47. Joint Reflection Cracking	Climate/Durability
48. Longitudinal/Transverse Cracking	Climate/Durability
49. Oil Spillage	Other
50. Patching	Climate/Durability
51. Polished Aggregate	Other
52. Weathering/Raveling	Climate/Durability
53. Rutting	Load
54. Shoving	Other
55. Slippage Cracking	Other
56. Swell	Other

Concrete Surfaced Airfields

<u>Pavement Distress</u>	<u>Distress Type</u>
61. Blow Up	Climate/Durability
62. Corner Break	Load
63. Linear Cracking	Load
64. Durability Cracking	Climate/Durability
65. Joint Seal Damage	Climate/Durability
66. Small Patch	Other
67. Large Patch/Utility Cut	Other
68. Popouts	Other
69. Pumping	Other
70. Scaling/Crazing	Other
71. Faulting	Other
72. Shattered Slab	Load
73. Shrinkage Cracking	Other
74. Joint Spalling	Other
75. Corner Spalling	Other

Unsurfaced Roads

<u>Pavement Distress</u>	<u>Distress Type</u>
81. Improper Cross Section	Other
82. Inadequate Roadside Drainage	Other
83. Corrugation	Climate/Durability
84. Dust	Other
85. Pothole	Climate/Durability
86. Rutting	Climate/Durability
87. Loose Aggregate	Other

Appendix G

Micro PAVER Network Installation

There are two methods for using Micro PAVER in a networked environment. The two methods vary based on the labor involved in setting up the system, and the capabilities of the network.

Method 1

This method sets up the Micro PAVER software on the network server, allowing up to two users at a time to use the system. However, there are some limitations to this method. Only one user can use certain features of PAVER (i.e. the work plan, condition analysis, and inspection scheduling) at a time. Also, each computer operating the software requires the system files for PAVER. In addition to creating the C:\EMS Program Files\User Data\ directory, PAVER installs several files in the C:\WINDOWS\SYSTEM\ directory. These are the files, referred to as system files, required to operate the tables and forms built in PAVER. To obtain the system files, it is necessary to install PAVER on the local machine. Since only the system files are necessary, it is possible to delete the CERL.ITS directory from the local computer that holds the main PAVER program. The main program is executed on the server. PAVER import/export features will not operate with this method. Any use of PAVER import or export features will lock other users out of the system.

Method 2

This method involves installing Micro PAVER on each PC. The databases are then stored on the server. To store the databases on the server, create a directory to house all of the PAVER databases. A local machine which has the database installed will have several files, which need to be moved to the remote pavement database directory. The first file to be installed is in the EMS Program Files\User Data directory. The file will be called (database name).pvr and should have a corresponding directory with the name of the database. The directory also needs to be copied to the master pavement database directory on the server. However, the systems files are not transferable, and remain on the local machine. This method will support any number of users. Users can access the same database, but PAVER has record-level locking security, which means that no two people can edit the same elements of the database simultaneously. However, this eliminates the conflict of running multiple work plans on the same database, since each user essentially works off of a copy of the original database. The PAVER import/export features do operate on this setup, but any database that is involved in an import/export operation is inaccessible by other users. This method is typically the faster of the two.

Note: The performance of the network systems will be decreased from the stand-alone Micro PAVER.

Appendix H

Computing Work Quantity from Distress Quantity

1. We look in the “Work Conversion By Work Type” table given below. If the work type is there (which is currently only true for Slab Replacement – PCC), we say the work quantity is equal to the slab area.

Work Name	Conversion Type	Multiplier
Slab Replacement – PCC	Slab Area	1

2. If there is no conversion by work type, we try to look up the conversion by distress type, severity, and work unit type in the table given below. If a matching record is found, we take the amount given by the conversion type column (e.g., for distress 21, we use slab width) and multiply it by the distress quantity and the value in the multiplier column to get the work quantity. The conversion type definitions are:

- a. Slab Width: Work quantity = distress quantity x slab width x multiplier
- b. Slab Length: work quantity = distress quantity x slab length x multiplier
- c. Slab Area: work quantity = (slab width x slab length) x distress quantity x multiplier.
- d. Constant: Work quantity = distress quantity x multiplier
- e. Joint Calculation: Work quantity = Joint Length x (distress quantity/number of slabs) x multiplier
- f. Distress Area: Work quantity = distress area x multiplier
- g. Slab Length + Width : Work quantity = (slab width + slab length) x distress quantity x multiplier
- h. Patch Area: Work quantity = distress quantity + (0.6096 x SquareRoot(Distress quantity/Multiplier) x (multiplier + 1)) + 0.3716

Otherwise, work quantity = distress quantity x multiplier

Distress Code	Description	Severity	Work Unit Type	Conversion Type	Multiplier
1	ALLIGATOR CRACKING	Any	Any	Patch Area	1.25
2	BLEEDING	Any	Any	Distress Quantity	1
3	BLOCK CRACKING	Any	Any	Distress Quantity	1
4	BUMPS/SAGS	Any	Any	Distress Quantity	1
5	CORRUGATION	Any	Any	Patch Area	1.25
6	DEPRESSION	Any	Any	Patch Area	1.25
7	EDGE CRACKING	Any	Area	Distress Quantity	0.5
7	EDGE CRACKING	Any	Linear	Distress Quantity	1
8	JOINT REFLECTION CRACKING	Any	Area	Distress Quantity	0.5
8	JOINT REFLECTION CRACKING	Any	Linear	Distress Quantity	1
9	LANE/SHOULDER DROP	Any	Any	Distress Quantity	1
10	LONGITUDINAL/TRANSVERSE CRACKING			Distress Quantity	1
11	PATCH/UTILITY CUT	Any	Any	Patch Area	1.25
12	POLISHED AGGREGATE	Any	Any	Distress Quantity	1
13	POTHOLE	H	Any	Constant	0.83613
13	POTHOLE	M	Any	Constant	0.55742
13	POTHOLE	L	Any	Constant	0.27871

Distress Code	Description	Severity	Work Unit Type	Conversion Type	Multiplier
14	RAILROAD CROSSING	Any	Any	Distress Quantity	1
15	RUTTING	Any	Any	Distress Quantity	1
16	SHOVING	Any	Any	Patch Area	1.25
17	SLIPPAGE CRACKING	Any	Any	Patch Area	1.25
18	SWELL	Any	Any	Patch Area	1.25
19	WEATHERING/RAVELING	Any	Any	Distress Quantity	1
21	BLOW-UP/SHATTER	H	Linear	Slab Width	1
21	BLOW-UP/SHATTER	H	Area	Slab Width	2
21	BLOW-UP/SHATTER	L	Linear	Slab Width	1
21	BLOW-UP/SHATTER	L	Area	Slab Width	1
21	BLOW-UP/SHATTER	M	Linear	Slab Width	1
21	BLOW-UP/SHATTER	M	Area	Slab Width	1.5
22	CORNER BREAK	L	Area	Constant	3
22	CORNER BREAK	H	Area	Constant	3
22	CORNER BREAK	L	Linear	Constant	2.5
22	CORNER BREAK	H	Linear	Constant	2.5
22	CORNER BREAK	M	Area	Constant	3
22	CORNER BREAK	M	Linear	Constant	2.5
23	DIVIDED SLAB	Any	Linear	Width	1
23	DIVIDED SLAB	Any	Area	Slab Area	1
24	DURABILITY CRACKING	L	Linear	Slab Width	1
24	DURABILITY CRACKING	H	Area	Slab Area	1
24	DURABILITY CRACKING	L	Area	Slab Width	1
24	DURABILITY CRACKING	M	Linear	Slab Width	1
24	DURABILITY CRACKING	H	Linear	Width	1
24	DURABILITY CRACKING	M	Area	Slab Width	1.25
25	FAULTING	Any	Any	Slab Width	1
26	JOINT SEAL DAMAGE	Any	Area	Joint Calculation	0.3048
26	JOINT SEAL DAMAGE	Any	Linear	Joint Calculation	1
27	LANE/SHOULDER DROP	Any	Area	SlabLength	1
27	LANE/SHOULDER DROP	Any	Linear	Slab Length	1
28	LINEAR CRACKING	Any	Linear	Width	0.5
28	LINEAR CRACKING	Any	Area	Slab Area	1
29	LARGE PATCH/UTILITY CUT	Any	Area	Slab Width	1.5
29	LARGE PATCH/UTILITY CUT	Any	Linear	Slab Width	1
30	SMALL PATCH	Any	Linear	Constant	0.5
30	SMALL PATCH	Any	Area	Constant	0.25
31	POLISHED AGGREGATE	Any	Linear	Slab Length	1
31	POLISHED AGGREGATE	Any	Area	Slab Area	1
32	POPOUTS	Any	Linear	Slab Length	1
32	POPOUTS	Any	Area	Slab Area	1
33	PUMPING	Any	Linear	Slab Width	1
33	PUMPING	Any	Area	Slab Width	0.3048
34	PUNCHOUT	Any	Area	Slab Width	1.5
34	PUNCHOUT	Any	Linear	Slab Width	1

Distress Code	Description	Severity	Work Unit Type	Conversion Type	Multiplier
35	RAILROAD CROSSING	Any	Linear	Slab Width	1
35	RAILROAD CROSSING	Any	Area	Slab Width	1.5
36	SCALING/CRAZING	M	Area	Slab Width	1.25
36	SCALING/CRAZING	M	Linear	Slab Width	1
36	SCALING/CRAZING	L	Linear	Slab Width	1
36	SCALING/CRAZING	L	Area	Slab Width	1.25
36	SCALING/CRAZING	H	Linear	Width	1
36	SCALING/CRAZING	H	Area	Slab Area	1.25
37	SHRINKAGE CRACKING	Any	Linear	Constant	1.5
37	SHRINKAGE CRACKING	Any	Area	Constant	0.305
38	CORNER SPALLING	Any	Area	Constant	0.25
38	CORNER SPALLING	Any	Linear	Constant	0.5
39	JOINT SPALLING	L	Linear	Constant	0.5
39	JOINT SPALLING	M	Area	Slab Width	0.5
39	JOINT SPALLING	H	Area	Slab Width	0.5
39	JOINT SPALLING	M	Linear	Slab Width	0.5
39	JOINT SPALLING	L	Area	Slab Width	0.25
39	JOINT SPALLING	H	Linear	Slab Width	1
41	ALLIGATOR CRACKING	Any	Any	Patch Area	1.25
42	BLEEDING	Any	Any	Distress Quantity	1
43	BLOCK CRACKING	Any	Any	Distress Quantity	1
44	CORRUGATION	Any	Any	Patch Area	1.25
45	DEPRESSION	Any	Any	Patch Area	1.25
46	JET BLAST	Any	Any	Distress Quantity	1
47	JOINT REFLECTION CRACKING	Any	Linear	Distress Quantity	1
47	JOINT REFLECTION CRACKING	Any	Area	Distress Quantity	0.5
48	LONGITUDINAL/TRANSVERSE CRACKING	Any	Any	Distress Quantity	1
49	OIL SPILLAGE	Any	Any	Patch Area	1.25
50	PATCHING	Any	Any	Patch Area	1.25
51	POLISHED AGGREGATE	Any	Any	Distress Quantity	1
52	WEATHERING/RAVELING	Any	Any	Distress Quantity	1
53	RUTTING	Any	Any	Distress Quantity	1
54	SHOVING	Any	Any	Patch Area	1.25
55	SLIPPAGE CRACKING	Any	Any	Patch Area	1.25
56	SWELLING	Any	Any	Patch Area	1.25
61	BLOW-UP/SHATTER	L	Linear	Slab Width	1
61	BLOW-UP/SHATTER	H	Area	Slab Width	2
61	BLOW-UP/SHATTER	M	Area	Slab Width	1.5
61	BLOW-UP/SHATTER	H	Linear	Slab Width	1
61	BLOW-UP/SHATTER	M	Linear	Slab Width	1
61	BLOW-UP/SHATTER	L	Area	Slab Width	1
62	CORNER BREAK	M	Linear	Constant	2.5
62	CORNER BREAK	H	Area	Constant	3
62	CORNER BREAK	M	Area	Constant	3
62	CORNER BREAK	L	Area	Constant	3

Distress Code	Description	Severity	Work Unit Type	Conversion Type	Multiplier
62	CORNER BREAK	L	Linear	Constant	2.5
62	CORNER BREAK	H	Linear	Constant	2.5
63	LINEAR CRACKING	Any	Any	Width	0.5
63	LINEAR CRACKING	Any	Area	Slab Area	1
64	DURABILITY CRACKING	H	Linear	Width	1
64	DURABILITY CRACKING	M	Area	Slab Width	1.25
64	DURABILITY CRACKING	M	Linear	Slab Width	1
64	DURABILITY CRACKING	L	Area	Slab Width	1
64	DURABILITY CRACKING	L	Linear	Slab Width	1
64	DURABILITY CRACKING	H	Area	Slab Area	1
65	JOINT SEAL DAMAGE	Any	Area	Joint Calculation	0.3048
65	JOINT SEAL DAMAGE	Any	Linear	Joint Calculation	1
66	SMALL PATCH	Any	Linear	Constant	0.5
66	SMALL PATCH	Any	Area	Constant	0.25
67	LARGE PATCH/UTILITY CUT	Any	Linear	Slab Width	1
67	LARGE PATCH/UTILITY CUT	Any	Area	Slab Width	1.5
68	POPOUTS	Any	Area	Slab Area	1
68	POPOUTS	Any	Linear	Slab Length	1
69	PUMPING	Any	Linear	Slab Width	1
69	PUMPING	Any	Area	Slab Width	0.3048
70	SCALING/CRAZING	L	Area	Slab Width	1.25
70	SCALING/CRAZING	H	Area	Slab Area	1.25
70	SCALING/CRAZING	H	Linear	Width	1
70	SCALING/CRAZING	M	Linear	Slab Width	1
70	SCALING/CRAZING	L	Linear	Slab Width	1
70	SCALING/CRAZING	M	Area	Slab Width	1.25
71	FAULTING	Any	Any	Slab Width	1
72	DIVIDED SLAB	Any	Linear	Width	1
72	DIVIDED SLAB	Any	Area	Slab Area	1
73	SHRINKAGE CRACKING	Any	Area	Constant	0.3048
73	SHRINKAGE CRACKING	Any	Linear	Constant	1.5
74	JOINT SPALLING	L	Linear	Constant	0.5
74	JOINT SPALLING	L	Area	Slab Width	0.25
74	JOINT SPALLING	M	Linear	Slab Width	0.5
74	JOINT SPALLING	M	Area	Slab Width	0.5
74	JOINT SPALLING	H	Linear	Slab Width	1
74	JOINT SPALLING	H	Area	Slab Width	0.5
75	CORNER SPALLING	Any	Linear	Constant	0.5
75	CORNER SPALLING	Any	Area	Constant	0.25

Glossary

Check Box

A Microsoft Windows standard user interface item for indicating a user selection. Check boxes are small square items that are displayed in an array for the user to make a selection(s) from. When the mouse is pointing to the check box and the left mouse button is clicked a check mark or 'X' will appear in the check box. Typically check boxes are used when more than one option can be selected from a list.

Critical PCI

Defined as the PCI value at which the rate of PCI loss increases with time, or the cost of applying localized preventive maintenance increases significantly.

Drop Down Menu

A Microsoft Windows standard menu, that is associated with a data entry form or grid. The drop down menu contains a list of the available selections for a data entry field. The drop list is not visible until the field associated with the drop list is selected by the user. When the Field is selected the drop list is activated by clicking the small down arrow located in the far right portion of the field mask. Alternately referred to as a picklist or drop list.

EMS Picture Server

The EMS Picture Tool is an interface for storing images associated with a particular pavement database. Images can be associated with the a network, or assigned to individual branches and sections. It provides a convenient way to establish a pictorial record of database units.

EMS Query

A PAVER for Windows tool used to temporarily select a subset of pavement sections for analysis or reporting. The application of a query to the active database does not cause any records in the database to changed or deleted. The query tool can also be used to specify the sort order of report results.

Family

A pavement “family” is defined as a group of pavement sections with similar deterioration characteristics. The family model is estimated from the plot of observed age and condition measurements for pavements with similar attributes.

Geographical Information System (GIS)

Geographical Information System (GIS) refers to a system that presents data in the context of a map. GIS can be used to display PAVER inventory, condition, distress, cost and other pavement data as color-coded maps.

Global Preventive Maintenance & Repair (M&R)

Defined as activities applied to entire pavement sections with the primary objective of slowing the rate of deterioration. This policy is applied to pavements above the critical PCI.

Localized Preventive M&R

Defined as distress maintenance activities performed with the primary objective of slowing the rate of deterioration. This policy is applied to pavements above the critical PCI.

Localized Stop-Gap (Safety) Maintenance and Repair

Stopgap M&R is defined as the localized M&R needed to keep the pavement operational in a safe condition. This policy is applied to pavements below the critical PCI.

Major M&R

Activities applied to the entire pavement section to correct or improve existing structural or functional requirements. It is also used to upgrade pavements below the critical PCI.

Modal

A Microsoft Windows form for displaying or collecting information. A modal form must be configured and executed or closed before you can resume other PAVER or Windows tasks.

Parameter Collection Screen

A Microsoft Windows form that is used to configure the PAVER Condition Analysis, Work Plan and Inspection Schedule Reports. The parameter collection screens displays the default settings for the various report parameters that can be configured by the user. In general the values on the form can be adjusted to reflect the desired setting. The parameter collection screen is a modal screen.

Pavement Branch

A branch is a readily identifiable part of the pavement network and has a distinct function. For example, an individual street or a parking lot would each be considered a separate branch of the pavement network. Similarly, an airfield pavement such as a runway or a taxiway would each be considered a separate branch.

Pavement Condition Index (PCI)

The PCI is the default condition index for the PAVER system. A numerical index, ranging from 0 for a failed pavement to 100 for a pavement in perfect condition. Calculation of the PCI is based on the results of a visual condition survey in which distress type, severity, and quantity are identified. It was developed to provide an index of the pavement's structural integrity and surface operational condition.

Pavement Identification (PID)

Pavement Identification (PID) is the unique combination of pavement inventory information that makes a particular pavement section unique. The PID is formed from the network ID, branch ID and section ID.

Pavement Network

A logical unit for organizing pavements into a structure for the purpose of pavement management. A network will consist of one or more pavement branches, which in turn may consist of one or many pavement sections. The network is the point of origin for the hierarchy of pavement management structures.

Pavement Section

A section should be viewed as the smallest management unit when considering the application and selection of M&R treatments. It is a logical unit assigned to a stretch of pavement that exhibits a common age, construction type, traffic and other criteria. The terminus or leaf point in the hierarchy of defined pavement management structures. A pavement section will be defined as a subordinate of a pavement branch, which in turn will be a subordinate of a parent pavement network.

PAVER Button Bar

The array of eight buttons displayed across the top of the PAVER for Windows Desktop are used to invoke the most used PAVER for Windows features. Each button contains descriptive text and a graphic related to the function of the program the button launches.

PAVERGIS

The program that transfers data from the PAVER (4.1 for Windows and 3.2g) environment to the GIS environment. It facilitates the process of linking pavement database information with representative objects in a GIS coverage.

Picklist

A Microsoft Windows standard menu associated with a data entry form or grid. The picklist menu contains a list of the available selections for a data entry field. The picklist is not visible until the field associated with the picklist is selected by the user. When the Field is selected the picklist is activated by clicking the small down arrow located in the far right portion of the field mask. Alternately referred to as a drop menu or drop list.

Polygon Attribute Table (PAT)

A Polygon Attribute Table (PAT) is a list used by a Geographical Information System (GIS) to relate database information (such as PAVER PCI values) to a GIS map location. In PAVERGIS the PAT is used to describe the sections in a PAVER database. Polygons are used in GIS to represent PAVER features (roads, parking lots, runways, aprons, etc) and then tabular data is attached to the features. A coverage is defined by several files. Some of the files contain graphical information, while others contain table information.

Radio Button

A Microsoft Windows standard user interface item for indicating a user selection. Radio buttons are small circular items that typically displayed in array for the user to make a mutually exclusive selection from.

Report Viewer

A standard PAVER for Windows interface used to display report results. The report viewer presents results as spreadsheet tables with associated graphs where applicable. The Condition Analysis Report, M&R Planning Report, and the Inspection Scheduling Report all present their results in the EMS Report Viewer format.

Right Button Click Feature

Added capabilities available for an object, either a PAVER spreadsheet table or a graph that are accessed by pointing to the object with the mouse and clicking the right mouse button.

Structured Query Language (SQL)

A standard database access language (collection of commands, control clauses, etc) supported by all major database managers. Structured Query Language, or SQL, provides a standard way to get or view information from a database, or put information into a database.

Tab Table Data

The common PAVER for Windows data that is edited on Tab Table forms. Tab Table data includes the PAVER User Defined Fields tables, Inventory picklists, Work Plan tables, Materials, and Misc. Other Tables.

Tab Table Form

Microsoft standard form for editing and reviewing data. The Tab Table form simulates index cards that can be selected by pointing to the index tab portion of the card with the mouse and pressing the left mouse button.

User Defined Fields

Discretionary inventory information that can be added to the existing attributes for networks, branches, and sections. A total of nine user defined fields are available, three for each inventory item.

View Menu

An item on the PAVER Menu, that is active only when the Report Viewer is the active window. The View Menu lists the available tables. Open tables have a check mark to the left of the menu item.

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